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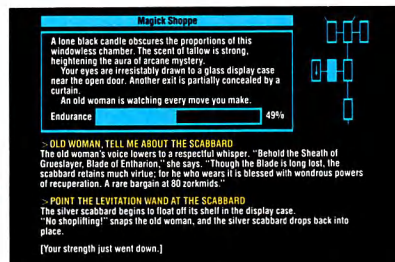
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Beyond Zork is available at your local dealer for the Apple II series, Macintosh, Commodore 128, Amiga, IBM PC and 100% compatibles, and Atari ST. To order direct, call 1-800-262-6868. Coming soon: Apple IIGS.

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One glance at *Beyond Zork* will show you that it's unlike any interactive story you've seen before. On-screen mapping. Window displays. A character that grows in strength and power. You get all the excitement of role-playing games, skillfully blended with the fabulous puzzles and award-winning prose of Infocom's interactive fiction.

Screen shown is for the Commodore 128 version.



Contents


4
Editor's Notes
Gregg Keizer

At Home

18
GEOS
Randy Thompson

26
Buyer's Guide to Adventure Games
Shay Addams

30
Sounding Board
Jenny Schmidt 


50
Galaxy Defender
Chris M. Sebrell 

**Contest
Winner!
Honorable
Mention**



At School

12
The Preschool Apple
Fred D'Ignazio

36
The Photo Exchange
James R. Haynes 

43
Gradebook
William Chin 

At Work

56
NoZap
Elwood Kureth 



Columns

5
Apple News & Notes
The Editors

10
Just for Fun
Dan Gutman

65
Tips, Tricks, & Tidbits
The Readers

66
Readers' Feedback
Readers & Editors



Reviews

58
Ticket to Paris
Carol S. Holzberg

59
Decisive Battles of the American Civil War
Robert L. Guerra

60
Where in Europe Is Carmen Sandiego?
Gregg Keizer

61
DB Master Version Five
Vincent D. O'Connor

62
SuperPrint
Duncan Teague

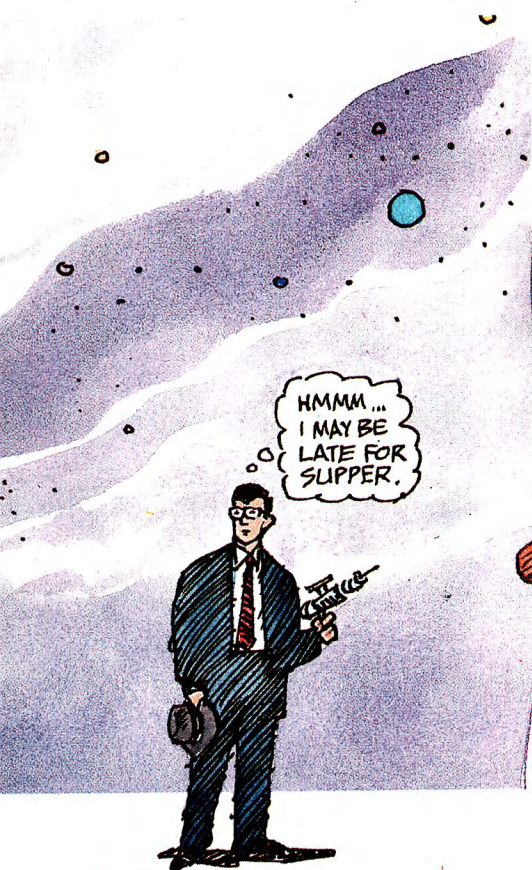
Program Entry Utilities

70
Apple MLX Version 1.1
Tim Victor

72
Apple Automatic Proofreader
Tim Victor

74
New Products

80
Advertisers Index



Editor's Notes

Graphics interfaces are back in the computer news again, this time with a vengeance. After a year-long absence—since last April when IBM introduced its PS/2 line and spoke proudly of its future *Presentation Manager* interface—the way people communicate with their computers is once more a hot topic.

Magazines like *Time*, newspapers like *The Wall Street Journal*, and, of course, the computer press, have been full of news about the Apple copy infringement suit brought against Microsoft and Hewlett-Packard. We've even dedicated part of this issue's "News & Notes" to the story.

I'll let others—maybe the courts, maybe the lawyers—decide who's right and who's not.

What seems to have been forgotten is what's being contested—a method of "talking," so to speak, with a computer. Not the cure for cancer, not a good book, not even a light bulb that lasts. Before the Macintosh, even before the Xerox Star—the acknowledged originator of the interface—there were computers and computer users. Pull-down menus, mice, adjustable windows, and icons aren't the only things that have defined quality software. When the Apple II became one of the first computers to reach more than those handy with a soldering iron, keyboard commands were the way to deal with a program. *VisiCalc*, the spreadsheet that brought the first wave of Apples into business, was a command-oriented program. Later, when the IIe was the Apple to own, and *AppleWorks* charged into Apple owners' lives, the file folder metaphor was it. Only recently has the graphics interface come to the Apple II, first in the form of the IIgs's Finder, now with *GEOS* from Berkeley Softworks (see "GEOS," in this issue).

The Finder isn't the last word in computer interfaces. Fiction writers like to say there are no new stories, just new ways of telling old ones. Figuring out ways to command a computer is much the same.

One of the most futuristic of these ways is speech recognition. When computers have the ability to listen to our speech and act accordingly, keyboard and mice will take a back seat. Speech recognition may not be around

the corner, but it's a safe bet that it will be in desktop computers before the end of the century.


Like all interfaces, there will be problems peculiar to its methods and madness. When speech becomes vital to accessing computers and their programs, for instance, what role will speech therapists play in society? Will stutterers suddenly demand help when they find themselves unable to use a computer? Will those with heavy accents, whether domestic or foreign, seek the flat tones of television news anchors?

Before we get speech recognition, however, other things may be tried by developers.

What about an Etch-a-Sketch interface? Instead of pointing to an icon or a pull-down menu, this interface would ask you to draw things from scratch. Draw a trash can or a file folder, for example. The Etch-a-Sketch interface may be graphic, but there's no danger of copyright infringement. Remember your creations on the red plastic box? There's no way anyone could duplicate your exact rendition.

Or how about a Toddler interface? That's where, instead of pointing to a representation of a trash can on the screen, you must point to the real thing. The instrument would be a long pointer cabled to the computer. Spreadsheets would be tough—you'd have to have something like numbered wooden blocks on a shelf, then point to the 1, then the 4, to enter 14. Children's alphabet blocks would skyrocket in price as toddler interface word processing programs proliferated, putting the blocks out of the reach (literally) of their former users.

If Apple wants to take its graphics interface, like a child with the only baseball in the neighborhood, and head home, so it goes. If need be, other ways of communicating with computers can be found. There are plenty of clever and creative software developers around. They'd all love to tell their interface story if they had half a chance.



Gregg Keizer
Editor

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The Results Are In

COMPUTE!'s *Apple Applications* recently tallied the results of its readership survey, a questionnaire that appeared in the February 1988 issue.

Surprisingly, the number of people who own or use an Apple IIgs is about the same as those who own or use an Apple IIe or an Apple IIc. Of those who responded, 10 percent own or use an Apple II compatible such as a Franklin Ace or Laser 128, 16 percent own or use an Apple II+, 28 percent own or use an Apple IIgs, 33 percent own or use an Apple IIe, and 33 percent own or use an Apple IIc. Note that these percentages add up to over 120 percent; obviously, there are quite a few people who own/use more than one type of Apple computer.

For over 40 percent of you, the Apple wasn't your first computer. The most common predecessor to the Apple was a Radio Shack or Tandy system.

Although most of you use your Apple computers at home, many of you put your computers to work in the office as well. Home users top the list at 91 percent, and 24 percent use their computers at work, while 17 percent use them at school. Again, the crossover between home, work, and school use accounts for the over 130-percent response.

At 80 percent, word processors are the most-purchased type of program. Close behind is database management and spreadsheet software, rounded out by games and entertainment. An intriguing piece of information: *Other* (other types of software) was checked more frequently than *programming software* as a recent purchase. Not too surprising when you consider that 80 percent of the readers who responded specified BASIC as the programming language of choice. If you already own Applesoft BASIC, why buy anything else?

As for *Apple Applications'* contents, the survey indicates that you want fewer articles on telecommunications and more programming/application tips and tricks. In response, we're going to beef up our "Tips, Tricks, & Tidbits" column. The *AppleWorks* templates and features are as popular as ever, so you can look forward to more of those as well.

Type-in programs continue to be

the magazine's driving force. General utilities and home applications are preferred, both getting about 65 percent of the vote. At the bottom of the list are business-application programs, with only 32-percent acceptability. Averaging out at 43 percent, educational programs, DOS utilities, graphics programs, and application-specific utilities are all about equal in popularity.

Readership surveys play an important role in the development of a magazine. No publication can stay stagnant. All magazines—specifically those focused on the fast-paced computer industry—must keep in touch with their readers. With your input, we'll be able to make *COMPUTE!'s Apple Applications* a magazine well suited to your needs.

— Randy Thompson

Did you fill out one of these?

COMPUTE!'s Apple Applications Readership Survey

What do you like about COMPUTE!'s Apple Applications? What don't you like? What kind of Apple or Macintosh system do you use, and what are you interested in doing with your computer?

We want to make COMPUTE!'s Apple Applications the top publication in its field and as valuable to you as possible.

Please take a moment to fill out and mail in this questionnaire (photocopies are fine). Although this isn't a scientific survey, it will allow us to draw some general conclusions about you, our readers.

Several of the questions may require you to

check more than one answer (if you have both a 5¼-inch and a 3½-inch disk drive, for example). Also, we're interested in hearing from you even if you don't own an Apple II, Macintosh, or Apple II compatible; perhaps you're reading the magazine because you're thinking about buying an Apple or Macintosh, or maybe you use one at your office or school.

Please mail the questionnaire to Readership Survey, COMPUTE!'s Apple Applications, P.O. Box 5406, Greensboro, NC 27403. We'll publish the results in an upcoming issue.

Which computer do you own or use?

- ☐ Apple II+
- ☐ Apple IIe
- ☐ Apple IIc
- ☐ Apple IIgs
- ☐ Apple II compatible (Franklin or Laser)
- ☐ Macintosh 128/512
- ☐ Macintosh Plus
- ☐ Macintosh SE
- ☐ I don't own or use an Apple or Macintosh

If you own an Apple II, Macintosh, or Apple II compatible, is it your first computer?

- ☐ Yes
- ☐ No

If you previously owned (or still own) a computer that is not an Apple II, Macintosh, or Apple compatible, what kind is it?

- ☐ Atari
- ☐ Commodore
- ☐ IBM PC
- ☐ Tandy/Radio Shack
- ☐ Texas Instruments
- ☐ Other:

If you have an Apple II computer, what kind of monitor do you own or use?

- ☐ Monochrome
- ☐ RGB color
- ☐ Composite color
- ☐ TV

Which disk drives do you own or use?

- ☐ 5¼-inch floppy
- ☐ 3½-inch floppy
- ☐ Hard disk
- ☐ Two or more disk drives

Which peripherals do you own or use with your Apple or Macintosh?

- ☐ Dot-matrix printer
- ☐ Letter-quality printer
- ☐ Color printer
- ☐ Laser printer
- ☐ 300-bps modem
- ☐ 1200-bps modem
- ☐ 2400-bps modem
- ☐ Mouse (Apple II+, IIe, IIc only)
- ☐ Joystick
- ☐ Graphics tablet
- ☐ Scanner
- ☐ Video digitizer
- ☐ Other:

Where do you primarily use your Apple II/Macintosh system?

- ☐ At work
- ☐ At home
- ☐ At school

Which types of Apple II/Macintosh software have you purchased?

- ☐ Word processor
- ☐ Spreadsheet

Database management

- ☐ Telecommunications
- ☐ Programming language
- ☐ Games/entertainment
- ☐ Graphics design
- ☐ Educational
- ☐ Other
- ☐ None

In which languages do you program on the Apple II or Macintosh?

- ☐ BASIC
- ☐ Pascal
- ☐ Assembly/machine language
- ☐ C
- ☐ Logo
- ☐ HyperTalk
- ☐ Other:
- ☐ I don't program

Which types of articles would you like to see in this magazine?

- ☐ AppleWorks information
- ☐ Apple news and rumors
- ☐ Telecommunications
- ☐ Using printers
- ☐ Programming explanations and tutorials
- ☐ Programming and applications tips and tricks
- ☐ Graphics
- ☐ Sound and music
- ☐ Personal and/or desktop publishing
- ☐ Hardware (add-on cards, scanners, new computers, and so on)
- ☐ How to use specific software applications
- ☐ New Apple/Macintosh products
- ☐ Buyer's guides to software
- ☐ Apple user group listings
- ☐ Other:

Which types of type-in programs would you like to see in this magazine?

- ☐ General-purpose home applications
- ☐ Business applications
- ☐ General utilities
- ☐ Utilities for programmers
- ☐ DOS 3.3 utilities
- ☐ ProDOS utilities
- ☐ Educational programs (K-8)
- ☐ Educational programs (9-12)
- ☐ Games/entertainment programs
- ☐ Graphics programs
- ☐ Print Shop utilities
- ☐ AppleWorks templates
- ☐ Other:

Which types of new product reviews would you like to see in this magazine?

- ☐ Home applications
- ☐ Business applications
- ☐ Educational software
- ☐ Games/entertainment
- ☐ Programming languages
- ☐ Utilities
- ☐ Hardware
- ☐ Other:

Which article in this issue do you like best?

Which article in this issue do you like least?

If you saw the first bimonthly issue, which article did you like best?

If you saw the first bimonthly issue, which article did you like least?

How many of the programs in this issue did you, or are you planning on, typing in?

Did you have problems typing in any program and getting it to run correctly?

- ☐ Yes
- ☐ No

Do you think additional instructions on how to type in the programs should be provided, that the instructions currently offered in the issue are insufficient?

- ☐ Yes
- ☐ No
- ☐ No opinion

Have you bought, or are you planning on buying, the companion disk for this issue?

- ☐ Yes
- ☐ No

If you answered yes to the previous question, why did you buy the disk?

Do you like the idea of an "AppleWorks For Everyone" article in each issue?

- ☐ Yes
- ☐ No
- ☐ No opinion

What else would you like to see in the magazine?

How did you happen to see this issue of COMPUTE!'s Apple Applications?

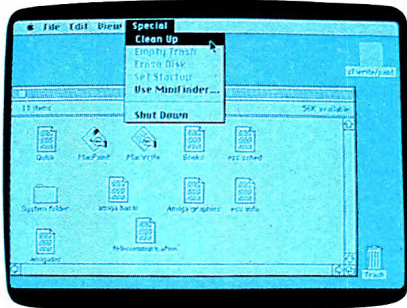
- ☐ I subscribe
- ☐ I bought the issue from a newsstand or a dealer
- ☐ I borrowed the issue

What is your age?

Additional comments:

Copyrighting an Interface

Apple stunned the microcomputer industry last March by filing a copyright infringement and unfair competition suit against both Microsoft, for its *Windows* 2.03 graphic interface, and Hewlett-Packard, for that company's *Windows*-like *New Wave* graphic environment. According to Apple, both of these products violate the "look and feel" of the Macintosh user interface.



The Apple Macintosh

The suit, filed on March 17 in the U.S. District Court at San Jose, California, pits Apple against two industry giants—Microsoft and IBM. IBM is involved in the action because OS/2, the operating system intended for IBM's PS/2 line of personal computers, will use a *Windows*-like interface called The Presentation Manager, which IBM has jointly developed with Microsoft. Many industry analysts believe that IBM and its new line of microcomputers are the real targets of the suit. If the legal status of The Presentation Manager is in question, many developers and users interested in the PS/2 with the OS/2 operating system may opt to delay their move to the new systems.

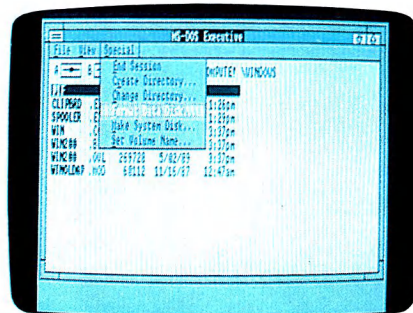
Will the suit succeed in court? Most industry pundits say no. There are three reasons for this belief. First, Microsoft has a 1985 license agreement with Apple that allows Microsoft to use the windowing environment found in *Windows* 1.x. Second, the ideas presented in the Macintosh's interface are viewed by many to be noncopyrightable: *You can't copyright a picture of a trash can* is one common remark. Third, the ideas (whether copyrightable or not) expressed in the Macintosh interface were not originated by Apple; they were almost entirely inspired by the Xerox Star—a system developed at Xerox's Palo Alto Research Center (PARC) that introduced, among other things, the graphics interface idea which included icons, mouse input, and windows.

Apple is a veteran of courtroom battles. In 1983, it triumphed over an

up-and-coming Franklin Computer Company, forcing them to pay \$2.5 million in damages for that company's copying of the Apple II's operating system. In a 1985 case closely related to the Microsoft suit, Apple forced Digital Research, Inc. (DRI) to alter its GEM (Graphics Environment Manager) interface to meet Apple's specifications. After the suit, GEM lost its momentum in the market.

Reaction to the suit by the microcomputer community has been almost uniformly against Apple. Many have even suggested that Apple is trying to stop progress by continuing to exploit eight-year-old ideas. In a positive mood, Phillip Kahn, president and founder of Borland International (famous for its *Turbo* languages), suggested that the software community itself should reconcile disputes without resorting to the courts.

Microsoft isn't taking this action sitting down. It's filed a countersuit for breach of contract against Apple. Although many industry watchers suggest that this is standard procedure for



Microsoft's *Windows* running on an IBM PC

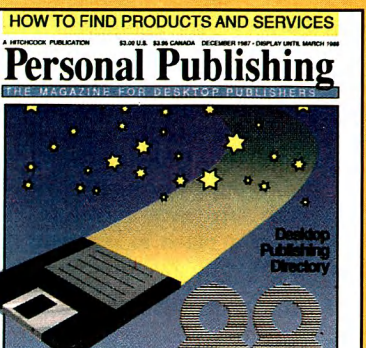
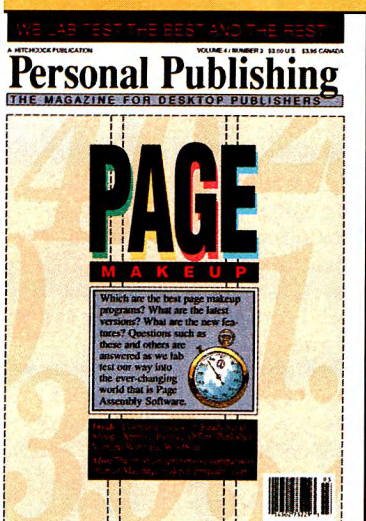
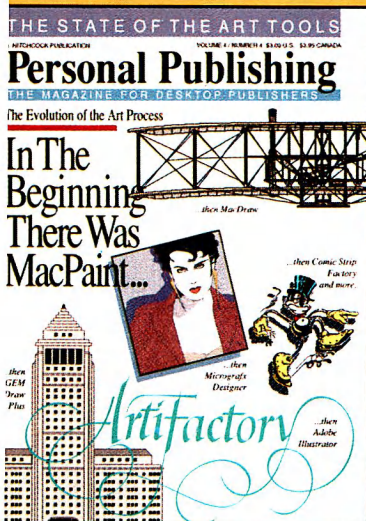
copyright infringement cases, the countersuit indicates that Microsoft is prepared to fight.

"Everyone seems to come out of this a loser," said one unnamed insider of the suit, but that may not quite be true. According to John Yound, President and CEO of Hewlett-Packard, the suit has offered free publicity to H-P and sparked interest in HP's previously little-known *New Wave* operating environment. Sales of the developer's kit have doubled since the suit, and end users seem excited about the product.

— Clifton Karnes



MELVIN TRIES TO COPY A CHOCOLATE DISKETTE.



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A IIGS with the Works, Please

Apple IIGS software publisher StyleWare (5250 Gulfton, Suite 2E, Houston, Texas 77081) has announced the August 1 release of *GSWorks*, an integrated software package for the Apple IIGS. Modeled after the ever-popular *AppleWorks* program, *GSWorks* plans to take full advantage of the IIGS and its windowing environment. The program will include six applications: word processing, database, spreadsheet, page layout, graphics, and communications.

Not satisfied with being just another "me too" product, *GSWorks* plans to improve on *AppleWorks* three basic applications. Running in a true IIGS environment, *GSWorks*' applications should operate faster, have more features, and be easier to use than their *AppleWorks* counterparts. In addition to word processing, database, and spreadsheet programs, *GSWorks* will offer page layout and professional-quality graphics. Current *AppleWorks* owners won't have to give up their old files either—*GSWorks* will read all *AppleWorks* file types.

Unlike *AppleWorks*' built-in word processor, the *GSWorks* word processor touts features such as different fonts, character styles and sizes, and text colors, as well as an online 80,000-word spell checker and thesaurus. The word processor also works in tandem with the database for mail merge capabilities.

Stock #	Fruit Name	Sort	Protect	Make Chart
1	Isen Orange	5		
2	Fuby Orange	5		
3	Wash. Movel	5		
4	Torocco Orange	5		
5	Trovato Orange	2		
6	Valencia Orange	5		
7	Reddish Grapefruit	1		
8	Clementine Tangerine	1		
9	Hawaii Pineapple	5		
10	Gancy Tangerine	2		
11	Kinnow Mandarin	5		
12	Imari Satsuma	2		
13	Limequits	2		
14	Minneapolis Tangelo	5		

StyleWare's GSWorks combines AppleWorks features with a true Apple IIGS operating environment.

GSWorks' database employs a graphic interface based on user-created forms. The database supports an extensive selection of data types including text, numeric, date, time, and even picture data.

Like all *GSWorks* applications, the spreadsheet is mouse-based. You simply point to the desired cell and click the mouse button. In addition, the spreadsheet will contain intelligent recalculation—updating only those cells affected by changes made to a cell. The *GSWorks* spreadsheet provides automatic color chart and graph generation.

One of *GSWorks*' most ambitious applications is its graphics program. The graphics application combines fea-

tures found in object-based drawing programs, such as *TopDraw*, with the bitmapped editing capabilities of a paint program. This way, users benefit from the ease of use and editability offered by paint programs while at the same time benefitting from the increased precision output of object-oriented graphics.

GSWorks includes a full-feature page-layout application, allowing users to integrate text from the word processor with images from the graphics application. The *GSWorks* page-layout application features multiple-column capability, compatibility with all IIGS graphics formats, complete text editing, and built-in tools for creating object graphics, rules, and lines.

The *GSWorks* communications application supports most popular modems, including Apple, Hayes, and Hayes-compatible modems. It includes a special review buffer, which saves text as it scrolls offscreen, so a user can scroll back and review the text.

GSWorks applications are fully integrated and operate in a Macintosh-like window-based environment. Users move from one application to another simply by clicking on a different application window. In addition, all six applications can be used at one time.

GSWorks will carry a suggested retail of \$249.95.

— Randy Thompson

Apple Links Up

Apple recently announced that it would take its popular AppleLink telecommunication network to the people that really matter—Apple users.

AppleLink—previously a communications network that tied together 17,000 Apple dealers, developers, and others—is to appear on Quantum, a consumer information service database out of Vienna, Virginia.

AppleLink Personal Edition will offer both Apple-specific areas of interest and the general services people have come to expect from electronic information forums.

In the Apple Community, AppleLink will be broken into seven areas: the Apple University, Forums, Headquarters, Software Center, Industry Connection, Reference Library, and Calendar & Events.

The Apple University will hold



Unlike most telecommunication networks, Quantum's new AppleLink has a specially designed software interface which provides easy-to-use, menu-driven access to the service.

electronic classes in such things as using *AppleWorks*, classes where the teacher will get online at specific times to answer questions and help students. The Forums, much like forums or SIGs on other services, will be led by Apple employees and will provide places for Apple II, Macintosh, and user-group devotees to gather. Headquarters makes it possible to ask Apple questions (answers will reportedly be given within 48 hours), read Apple press releases, and peruse news about Apple and its products.

The Software Center details the Apple's top-ten software and is a place where product developers can communicate. The Industry Connection is filled with third-party software publishers and hardware manufacturers looking for a place to circulate their news and provide electronic cus-

tomer service. Companies such as Activision, Beagle Bros., Brøderbund, Davidson, Electronic Arts, Epyx, Orange Micro, and TML Systems were signed up as of this writing.

The Reference Library holds much of what AppleLink used to be devoted to—technical information for developers, programmers, and others interested in how to make things work on the Apple II. A section called Calendar & Events outlines the schedule of the Apple Community, highlighting such things as teleconferences with stars of the Apple universe.

The flip side of the Apple Community is Quantum's General Services, an area that includes such standard offerings as business news; recreational tidbits (RockLink and SportsLink are two); news of sports, weather, and national and world events; computer shopping; an electronic travel agency; and an online encyclopedia.

But it's not just the services which will set AppleLink apart from other information services which provide Apple forums. The software necessary to access AppleLink Personal Edition comes from Apple and makes telecommunications as simple as putting a disk in the drive, turning on the computer, and making a selection from an icon-based menu. It runs on any 128K Apple (with separate versions for the

Apple IIe/IIc and Apple IIGS). Users select from a menu screen, which then takes them to the desired part of AppleLink. Even the troublesome details of telecommunicating—from signing on to downloading public domain and shareware software—has been simplified to the point where anyone who uses a computer should feel comfortable getting on to AppleLink. There won't be arcane commands to memorize to move from one part of AppleLink to the other: point and click with a mouse or hit a cursor key and Return, and you're transported to your destination.

The AppleLink menu screens for the IIGS looked, as people have come to expect from the IIGS, dazzling. Menus for the other Apple IIs were plainer, though still light years ahead of other services graphically. AppleLink Personal Edition will be available in June, with the software package running \$35.00—price includes software, manual, year subscription to the magazine *AppleLink Update*, and 2 hours of free non-prime time use. Connect time costs \$6.00/hour for non-prime time use and \$15.00/hour for prime time use. There won't be surcharges for high-speed connects, a welcome policy for everyone with a 1200 or 2400 bps modem.

— Gregg Keizer

Apple Doubles Its Income

Apple Computer announced that its earnings for the second quarter of 1988 have increased by more than 100 percent. Reported earnings are now up to a cool \$79.7 million—almost \$46 million more than last year. Market analysts had predicted a good quarter for Apple, but none expected such a large increase in income.

The new line of Macintosh computers contributed the most to Apple's recent financial success. Once touted as the "computer for the rest of us," the Apple Macintosh is quickly becoming the computer for *all* of us. Currently strongest in the small-business world, the Macintosh is steadily working its way into schools, following in the footsteps of the venerable Apple II line.

Apple's recent lawsuit against Microsoft and Hewlett-Packard doesn't seem to be hurting profits either. If anything, it's causing delays in the release of The Presentation Manager—a new Mac-like interface from IBM that may someday slow sales of the Macintosh.

— Randy Thompson

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Whatever Happened to Bill Budge? (And the Other Software Superstars of Yesteryear)

Dan Gutman

"We're sorry, but the number you have dialed is not in service at this time." I'm getting used to hearing that on the phone these days.

After reading one too many "Whatever Happened to..." articles about aging rock stars, I started thinking about the early days of the computer games business. Some of you younger readers won't know what I'm talking about here, but those of us who've been around the block a few times remember companies like Creative Software, Synapse, Muse, HES, and Imagic. We remember playing games like *Congo Bongo*, *Miner 2049er*, *Worm Whomper*, *Gruds in Space*, and my all-time favorite, *Communist Mutants from Space*. We recall names like David Lubar, Dave Gordon, and Ihor Wolosenko.

Some of the high-profile people from the old days are still in the news. Steve Jobs and Steve Wozniak, who not only founded Apple, but also codsigned the Atari arcade game *Breakout*, still make headlines. Bill Gates of Microsoft is bigger (and richer) than ever. Doug Carlston, who founded Brøderbund, and Trip Hawkins of Electronic Arts still head up their successful companies. Ken and Roberta Williams are still with Sierra On-Line, now called simply *Sierra*. Chris Crawford, whose *Eastern Front* was a big hit in 1982, followed it up more recently with intriguing games called *Balance of Power* and *Trust and Betrayal* (both from Mindscape).

But what about the others? I remember the days when you couldn't read a magazine article without hearing about Bill Budge and his remarkable *Pinball Construction Set*. Whatever happened to Budge? Is he working on something incredible right now? Or is he pumping gas in Palookaville? I haven't heard anything about him in years. Did Bill Budge and all the others have their 15 minutes of fame and fall off the face of the earth? I decided to try to track down some of these people.



Have you seen this man?

Hitting the Phones

After digging through my files for about an hour, I came up with an old phone number for Budge and nervously called it. To my surprise, the phone rang and Bill's answering machine encouraged me to leave a message. Hopefully, he'll call back.

Is he working on something incredible right now? Or is he pumping gas in Palookaville?

Inspired, I dug up some other numbers. I dialed Mark Turmell, whom I'd met in Chicago's O'Hare airport after he had made a fortune selling games like *Sneakers*, *Turmoil*, and *Fast Eddie* to Sirius Software. Mark's phone number was no longer in service. The same happened with Russ Wetmore, whose *Preppie* is one of the silliest (and most clever) games I've seen. I was starting to run into brick walls.

I called a number I had for Eugene Jarvis, the guy who created the classic games *Defender* and *Robotron*. My heart raced when the phone started ringing. But then a machine clicked on and said, "Hi, this is Betsy. I'm not home right now..." I left a message, but I sure don't expect to hear from Jarvis.

Checking Out Old Contacts

The old phone numbers weren't working, so I started calling people I knew were still around. Maybe there's a network of game people out there who know each other.

Charlotte Taylor, the publicity director at Electronic Arts, tells me that Mark Turmell moved to L.A. and is working at Hasbro on interactive movies. Not only that, but he's collaborating with David (*Pitfall*) Crane. The two worked together at Activision, so I guess they went to Hasbro as a team. Charlotte checked with Electronic Arts' Bing Gordon, who says Bill Budge is working on a "radically new kind of fun software for the Mac, and spending a lot of time windsurfing." (If you've been in this industry awhile, you know that *every* new game is called a radically new kind of fun.)

Dick Spitalny, the president of First Star Software, tells me Fernando (*Astro Chase*) Herrera is still with the company, but now he's more on the management side. Mike Livesay, who programmed *Miner 2049er* for the Apple, has just completed a program called *Arcade Game Construction Set* and sold it to Brøderbund. According to Spitalny, Russ Wetmore wrote *Homepak* for Batteries Included a few years back, and now works for Microsoft.

Sara Groves, who is in charge of CompuServe's game forum, gave me the ID numbers of Wetmore and Scott Adams, whose Adventure International was a pioneering adventure-games house. I sent them each a message, via electronic mail, to contact me.

Remember Crowther and Woods, the two guys who created *Adventure*, the first adventure game? Well, a source who prefers to remain anonymous tells me that Crowther is now working on "top-secret military stuff" in Kentucky, perhaps involving the Strategic Defense Initiative. (That's all we need, a nuclear shield over the United States that plays like *Zork*!) Don Woods, I understand, works at Xerox on "heavy-duty applications."

Speaking of *Zork*, Mark Blank is now working on the evolving field of

CD-I with a disk called *Danger in Dreamland* with The Firesign Theater.

Eugene Jarvis never returned my call (neither did Betsy), but Marc Canter (*MusicWorks*, *VideoWorks*) of MacroMind told me that Jarvis is at Stanford getting his MBA.

Of the guys who broke away from Atari to form Activision, Bob Whitehead and Alan Miller sold their Activision stock to start Accolade. Since the company has gotten off the ground, they've been joined by Steve Cartright, another programmer originally with Activision. Jim Levy, the record industry exec who pulled all these guys together in the first place, is now consulting and writing a book, from what I hear.

Bill Budge still hasn't returned my call.

Matt Hubbard, another ex-Activision man whose best game was *Dolphin*, had an unusual experience last year. He went on "Jeopardy" and put to rest the myth that computer people don't know anything besides computers. Hubbard came home with \$25,000.

I noticed recently that *Wizardry* creator Robert Woodhead programmed something called *MandelColor*, which creates onscreen kaleidoscopic images. All proceeds are going to the Vision Fund, a charity that provides computers to visually handicapped students.

Scott Adams didn't return my electronic mail—his wife Alexis did. I had heard that Adventure International was out of business, but Mrs. Adams says, "We are alive and kicking, and who knows what lurks in the near future."

Bill Budge still hasn't returned my call.

No word from Russ Wetmore, but Alex (*Stargunner*) Leavens tells me that Wetmore is working at Apple, not Microsoft. He also says that Rob (*Demon Attack*) Fulop has his own game consulting company, and that Fulop created the online *Rabbitjack Casino* game for QuantumLink. John Harris, who did the Atari versions of *Frogger* and *Jawbreaker*, is now doing graphics for a cable TV company, according to Leavens.

Leavens, who is now working full-time at Activision, set me straight about the difference between "then" and "now" in the computer games business: "You can't be an 'artiste' anymore. You can't be a hacker, work in your home, and make a zillion dollars. In the old days, you'd license your first game for \$50,000 and start your own company. That was the lure. A lot of

people went out and bought Porsches. But the kids found out real quick at the end of six months that they didn't have any money and maybe it's time to start thinking about getting a real job. The prima donna mentality is gone.

"And it's tough to get a job," continued Leavens. "A lot of companies don't recognize writing games as legitimate programming. You can't get a million dollars now."

Computer Journalists

Then there are my journalistic colleagues, who at one time were superstars in their own right. Michael Blanchet, a teenage whiz with a joystick who made the *New York Times* best-seller list for one glorious week in 1982 with *How to Beat the Video Games* (Simon and Schuster), is now part owner of a video store in Rockaway, New Jersey. Blanchet told me that a while back he sold his Adam computer, "which was more than Coleco ever did," he says. Craig Kubey, who also hit the list with *Scoring Big at Pac-Man* and *The Winners' Book of Video Games* (Warner Books), had another hit with *The Viet Vet Survival Guide* a few years ago.

Steve Levy, who wrote *Hackers* (Doubleday) about the pioneers of the computer age, has just completed a nonfiction book about a murder for Prentice-Hall. Steve Bloom, who wrote *Video Invaders* and edited *Video Games* magazine, lives down the street from me in Brooklyn, and you may see his by-line in *Rolling Stone*, *TV Guide*, or *USA Today*. Steve is also writing a screenplay, incidentally, with yours truly. I was over at his apartment last week, and noticed ten well-thumbed copies of his book. He told me he saw them on the discount rack of a bookstore and snapped them up for \$1 apiece. A bittersweet moment for any author.

You may remember Ken Uston, the guy who was booted out of several casinos for card counting, and then went on to design the game *Ken Uston's Blackjack* and write several hit books on computers, as well. Sadly, Uston passed away last year. There is some mystery surrounding the circumstances of the death, and I'm told it took place in a Paris hotel room (shades of Jim Morrison).

And me? Well, I'm both happy and sorry to say this will be my last "Just for Fun" column. I'm going to be spending most of the next year writing a book about baseball for Penguin. Who knows? Maybe you'll still be here when I've finished.

Maybe by that time, I'll know whatever happened to Bill Budge.

Dan Gutman is the author of I Didn't Know You Could Do That with a Computer! (COMPUTE! Books) and writes a syndicated column of the same name.



Coming Attractions

Coming in the October issue of *COMPUTE!'s Apple Applications*:

On-Line Education. With a computer, a modem, and some terminal software, you can take a class in science, art, literature—almost anything—all from your computer console.

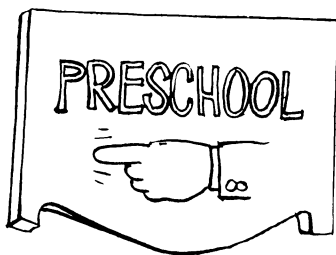
Window Pack. Add windows and pull-down menus to your BASIC programs with "Window Pack"—a programming utility that adds commands to Applesoft BASIC.

The Finder Found Out. Take a close look at what the IIGS *Finder* has to offer. Learn what it is, how it operates, and how you can get the most out of it.

Fractal Sketcher. Explore fractal graphics with this user-friendly program. See just how easy computer-generated art can be.

Apple Art. Looking for the best in Apple graphics? This buyer's guide provides a complete list of painting and design programs for the Apple II-series computer.

An Award-Winning Issue. The October issue contains three winners from *COMPUTE!'s Apple Applications* \$10,000 programming contest: "Window Pack," "Fractal Sketcher," and "Cribbage." A power-packed trio of programming prowess.



The Preschool Apple

Fred D'Ignazio

Is your preschooler too young to use the computer?

Ten years ago I wrote a book called *Katie and the Computer*. It was about a little girl, Katie, who fell into her father's magic computer and survived all kinds of adventures—meeting a giant bug, parachuting onto RAM Tower, and being shot out of a pirate's cannon (the CRT's electron guns)—in order to return home. Although the book was successful, it was seen as a novelty since it described a home computer which had color graphics and sound and since it was intended for preschoolers.

Today, with computers like the Apple IIe, IIc, and especially the Apple IIGS, graphics and sound-intensive computers are everywhere. And there are dozens—perhaps hundreds—of programs for preschoolers. Early learning games are one of the largest segments of the educational computing market.

If you're a parent or a teacher of young children (ages 1–5), there are many good reasons for buying early learning games. Unfortunately, there are bad reasons, too.

Tiny Bytes

A few years ago, a school was started in California named Tiny Bytes. At Tiny Bytes, a child could learn how to use the computer while still an infant. *Computer literacy* was viewed as a basic skill, on par with learning to walk and talk.

Tiny Bytes may or may not still be around, but there are many parents who believed then, and believe now, in its message. They push their young children to master computer skills, believing that these skills are the keys to future success in school and work.

On the surface, this is true. Many studies confirm that computers will soon become a central part of classroom learning and an essential tool at work. The problem is that computers themselves are changing. If the wrong skills and attitudes are stressed, training a child on the computers of today may actually be more of a handicap than a headstart.

For example, it makes little sense to train a child to program, since programming jobs in the future will

make up only a scant percentage of all computer-related jobs. Likewise, undue stress on keyboard use, word processing, and other low-level skills also may prove unwise, since it now appears that computers in the late 1990s and beyond will be voice-activated and will function more like intelligent secretaries and assistants rather than simple typewriters and filing cabinets.

Even more harmful, parents who pressure their children to get in front of the computer at too young an age may unwittingly be causing their children to develop negative attitudes toward the machine. If children see computing as something they *ought* to do rather than something they *want* to do, they may carry this attitude into adult life and unconsciously do everything they can to avoid using a computer. I know about this sort of problem from personal experience, as many of you probably do, from the times I was forced to practice the piano. As an adult, I still avoid sitting down at a piano even though I have the skill to play it reasonably well.



Tool, Tutor, or Toy?

The most important outcome of a child's first encounter with computers should be a positive attitude. The best way to assure this outcome is to make computing part of the child's world rather than the other way around.

For older children, computers can play a healthy role as tutor or tool. Children can learn new subjects from a computer, review old subjects, and use the computer to help them with their schoolwork.

Younger children have different needs. They acquire most of their learning through play. For the young child, a computer should be seen primarily as a playmate or toy. This doesn't make the computer's role any less instructional or profound. It just places the computer on a wavelength more appropriate for a preschooler's level of development.

What are some positive outcomes to strive for? Here are three:

- **Success.** Young children should have experiences with computers which give them a sense of mastery and control and which raise their self-confidence and self-esteem.
- **Pleasure.** It's enough for young children to have fun using computers.

Pleasurable experiences with computers will encourage a child to return to computers when he or she is older and can work on higher-level tasks.

- **Sharing.** If you and your child work on the computer together (*and you have fun*), your child will associate the computer with you, with having your attention, and with socializing and cooperating with other people. He or she will not see the computer as something one uses to get away from other people.

No matter how much computers change, people will continue to use them to think, to learn, to communicate with others, and as a source of entertainment. If you look for programs which encourage your child to solve problems, learn, communicate with you and others, and have fun, then you're making the associations with computers which can survive the swift changes in computer technology.

Giving your child regular, hands-on exposure to a computer is also helping him or her in another way. You're preparing your child for high schools, colleges, and jobs where computers are as essential as a pencil and paper. Many of today's college students and new employees in the corporate workplace are intimidated by computers because

they had little or no experience using computers at home or in school.

For budget reasons, lack of teacher training, and organizational inertia, many schools are still slow to introduce computers into students' daily lessons. If this is the case with your child's school, you can play a valuable role by exposing your child to a computer at home to supplement the small amount of time he or she has with computers at school.

Why Apples?

So it's important to give a child early exposure to computers. Does that mean the computer has to be an Apple?

Certainly not. Any computer will do. However, there are compelling reasons for using Apples instead of other computers. First, almost 90 percent of all primary and secondary schools in the U.S. have at least one Apple computer. Second, almost 60 percent of all schools use Apple computers exclusively. Third, Apple II computers have the largest body of preschool software and educational software. If you start your preschooler on an Apple II, the chances are good that he or she will use the same computer in school. The programs you use at home may even be the same as those at school.

Basic Skills

Your primary goal should be to encourage your preschooler to associate computers with thinking, learning, communicating, and having fun. There are dozens of programs that provide these experiences and teach some basic skills at the same time.

Skills which a computer can help teach or reinforce, skills most appropriate for preschool children, include:

Reading readiness
Math readiness
Science readiness
Introduction to the computer
Pattern recognition and problem-solving
Everyday living skills
Cooperative learning/social skills
Imagination and creativity
Communication and self-expression

Remember, it's not *what* your preschooler learns on the computer, it's *how* he or she learns it. A parent or teacher should carefully screen a new program before allowing a preschooler to use it. The program should have at least the following features in order to even be considered.

- It must have the same values as the parent.
- It must reward the child for honest effort as well as correct answers.
- It must not harm the child's self-image.
- It must encourage the child to guess, estimate, speculate, and explore.
- It must not penalize the child for mistakes, but use mistakes as an opportunity to discover the right answer.
- It must be patient.
- It must be gentle.
- It must use sound and graphics in an appropriate (rather than overwhelming) fashion.
- It must be challenging but not frustrating.
- It must personalize the learning experience (such as by using the child's name).
- It must encourage the child to reflect and think, not just to press buttons.
- It must engage a child's imagination.
- It must start simple but be complex enough to challenge a child as he or she learns and grows.

The "Preschool Software" sidebar to this article lists several preschool software products.

Joysticks, Touch Windows, & Muppet Keys

Joysticks are the most common computer input device other than the computer keyboard. They are also the hardest device for young children to operate. According to one educator,

"It's as hard for a preschooler to operate a joystick as it is for adults to drive through heavy traffic with their elbows."

Fortunately there are other devices which young children can use, including special keyboards and touch windows. Sunburst Communications, a leader in software for early learning, offers a touch window (\$199.95 plus \$9.95 for an Apple II adaptor) and a special keyboard—the Muppet Learning Keys (\$99)—for young children. To operate the touch window, you just press the window (which is fastened to the front of your computer monitor with velcro) with a special plastic pencil or with your finger.

Muppet Learning Keys is an accessory keyboard which plugs into your computer's joystick port. It features large, colorful keys which are more appropriate for young children than the regular Apple keyboard. Sunburst makes several programs, including *Muppetville* (\$65), *Muppet Word Book* (\$65), and *Muppet Slate* (\$75), all especially designed for use with the Muppet Learning Keys.

Fred D'Ignazio is the author of numerous books, including COMPUTE!'s Computing Together (COMPUTE! Publications), and he is a popular speaker on educational computing issues.

Preschool Software

Here is a list of some of the best programs in each of the skill areas mentioned in "The Preschool Apple." All the Sunburst software listed with an asterisk (*) runs on the Muppet Learning Keys keyboard, also available from Sunburst.

Note: Many programs for older children are listed because they can be used by adults and preschoolers working together.

Name	Price	Grade	Publisher
Reading & Reading Readiness			
Alphabet Circus	\$32.95	Pre-2	Neosoft (distributed by DLM)
Alphabet Express	\$44.95	Pre-2	Gamco
Early Games for Young Children	\$34.95	Pre-1	Springboard
Easy as ABC	\$39.95	Pre-1	Springboard
First Letters & Words	\$49.94	K-2	First Byte (distributed by Electronic Arts)
First-Letter Fun	\$55.00	Pre-K	MECC
Fun from A to Z	\$55.00	Pre-K	MECC
Getting Ready to Read and Add*	\$65.00	K-1	Sunburst
Grownup and Small	\$39.95	Pre-3	Mindscape
Juggles' Rainbow	\$29.95	Pre-K	The Learning Company
Letters and Words	\$49.95	Pre-3	Mindscape
Muppet Slate*	\$65.00	K-2	Sunburst
Muppet Word Book*	\$65.00	K-1	Sunburst
My Letters, Numbers, and Words	\$39.95	Pre-1	Stone & Associates
Paint with Words	\$55.00	Pre-2	MECC
Peter Rabbit Reading	\$24.95	Pre-K	Fisher-Price (distributed by Spinnaker)
Reader Rabbit	\$39.95	K-2	The Learning Company
Richard Scarry's Best Electronic Word Book Ever	\$29.95	Pre-3	Mindscape
Spell It!	\$49.95	1-6	Davidson & Associates
Word Bank	\$49.95	1-4	Mindscape
Word Magic	\$49.95	1-4	Mindscape

Name	Price	Grade	Publisher
Word Wizards	\$55.00	K-6	MECC
Speller Bee	\$49.95	K-9	First Byte (distributed by Electronic Arts)
Spelling and Reader Primer	\$9.95	K-3	Eduware (distributed by Britannica Software)
Stepping Stone: Level I	\$39.95	Pre-K	Compu-Teach Educational Software
Stepping Stone: Level II	\$39.95	1-2	Compu-Teach Educational Software
Stickybear ABC	\$39.95	Pre-1	Weekly Reader Family Software

Math & Math Readiness

Arithmetic Critters	\$55.00	K-2	MECC
Balancing Bear*	\$65.00	K-4	Sunburst
Blaster Plus	\$49.95	1-6	Davidson & Associates
Counters	\$65.00	K-1	Sunburst
Counting Critters	\$55.00	Pre-K	MECC
Counting Critters	\$39.95	Pre-3	Mindscape
Cotton Tales	\$49.95	Pre-3	Mindplay
Hodge Podge	\$14.95	Pre-1	Artworx
How to Weigh an Elephant	\$14.95	Pre-1	Learning Technologies
Iggy's Knees*	\$65.00	1-4	Sunburst
Introduction to Counting	\$9.95	K-3	Eduware (distributed by Britannica Software)
Kid's Stuff	\$39.95	Pre-1	Stone & Associates
Knowing Numbers	\$49.95	Pre-3	Mindscape
Learning To Add & Subtract	\$14.95	Pre-3	Learning Technologies
Let's Go Fishing	\$14.95	Pre-1	Learning Technologies
Math and Me	\$39.95	Pre-1	Davidson & Associates
Math Blaster	\$49.95	1-6	Davidson & Associates
Math Courseware	\$34.95	K-6	Mindscape
Math Magic	\$49.99	Pre-4	Mindplay
Math Rabbit	\$39.95	K-2	The Learning Company
Monkey Math	\$17.95	K-4	Artworx
Number Farm	\$32.95	Pre-2	Neosoft (distributed by DLM)
Number Sea Hunt	\$44.95	Pre-3	Gamco
Sesame Street Learning Library	\$29.95	Pre-1	Hi Tech Expressions
Space Waste Race	\$65.00	K-2	Sunburst
Teddy's Playground*	\$65.00	K-4	Sunburst
Understanding Math	\$69.95	1-6	Mindscape

Patterns, Directions, Problem-Solving

Animal Hotel	\$14.95	Pre-3	Learning Technologies
Bike Hike	\$14.95	Pre-3	Learning Technologies
Blockers and Finders	\$65.00	1-12	Sunburst
Bounce!	\$65.00	K-8	Sunburst
Dinosaurs	\$39.95	Pre-1	Advanced Ideas (distributed by Banana, CSS, and Soft-Kat)
First Shapes	\$49.94	K-2	First Byte (distributed by Electronic Arts)
The Flying Carpet	\$14.95	Pre-1	Learning Technologies
Fun with Directions	\$49.95	Pre-3	Mindscape
Gertrude's Secrets	\$44.95	K-4	The Learning Company
Lion's Workshop	\$39.95	Pre-1	Learning Technologies
Muppetville*	\$65.00	K-1	Sunburst
Patternmaker	\$9.95	1-12	Mindscape
Right of Way	\$45.00	Pre-2	MECC
Same or Different	\$14.95	Pre-3	Learning Technologies
Shape and Color Rodeo	\$32.95	Pre-2	Neosoft (distributed by DLM)
Shapes and Patterns	\$49.95	Pre-3	Mindscape
Shape Starship	\$44.95	Pre-2	Gamco
Shutterbug's Patterns	\$14.95	Pre-3	Learning Technologies
Shutterbug's Pictures	\$14.95	Pre-3	Learning Technologies
Stickers	\$34.95	K-1	Springboard
Stickybear Opposites	\$39.95	Pre-1	Weekly Reader Family Software
Stickybear Shapes	\$39.95	Pre-1	Weekly Reader Family Software

Name	Price	Grade	Publisher
Tink Tonk Games	\$29.95	K-4	Mindscape
Webster's Numbers	\$9.95	Pre-2	Mindscape
Science			
Playing with Science: Temperature	\$99.00	K-7	Sunburst
Everyday Living			
Body Awareness	\$49.95	Pre-3	Mindscape
Grownup and Small	\$39.95	Pre-3	Mindscape
My Very Own Calendar	\$49.95	1-3	Mindscape
Telling Time	\$44.95	Pre-3	Gamco
Telling Time	\$39.00	Pre-3	Orange Cherry Software
Imagination & Creativity			
Build a Book	\$24.95	1-5	Mindscape
Color Me	\$29.95	K-5	Mindscape
Picture Perfect	\$49.95	Pre-12	Mindplay
Puzzle Master	\$34.95	Pre-12	Springboard
Rainbow Painter	\$34.95	Pre-4	Springboard
Sesame Street Crayon	\$14.95	Pre-K	Polarware
Songwriter	\$9.95	1-8	Mindscape
Communication & Self-Expression			
Mr. Rogers' Neighborhood Many Ways to Say I Love You	\$29.95	K-3	Mindscape
Print Shop	\$59.95	K-12	Brøderbund
Introduction to the Computer			
Electric Crayon—ABC's	\$14.95	Pre-K	Polarware
Electric Crayon—Dinosaurs Are Forever	\$29.95	Pre-K	Polarware
Electric Crayon—Fun on the Farm	\$14.95	Pre-K	Polarware
Electric Crayon—Holidays and Seasons	\$29.95	Pre-K	Polarware
Electric Crayon—This Land is Your Land	\$14.95	Pre-K	Polarware
Face Maker: Golden Edition	\$39.95	Pre-1	Spinnaker
The Friendly Computer	\$45.00	K-3	MECC
KinderComp: Golden Edition	\$39.95	Pre-1	Spinnaker
Stickybear Typing	\$39.95	Pre-12	Weekly Reader Family Software
Ten Little Robots	\$49.95	Pre-K	Unicorn Software

For further information about the preschool software listed above, contact these publishers.

Artworx Software
1844 Penfield Rd.
Penfield, NY 14526

Banana Software
6531 Park Ave.
Kent, OH 44240

Britannica Software
185 Berry St.
San Francisco, CA 94107

Brøderbund
17 Paul Dr.
San Rafael, CA 94903

Compu-Teach Educational Software
10630 N. Blaney Ave.
Cupertino, CA 95014

CSS
Computer Software Service
2150 Executive Dr.
Addison, IL 60101

Davidson & Associates
3135 Kashiwa St.
Torrance, CA 90505

DLM
One DLM Park
200 E. Bethany Rd.
Allen, TX 75002

Electronic Arts
1820 Gateway Dr.
San Mateo, CA 94404

Gamco Industries
P.O. Box 1911
Big Spring, TX 79721-1911

Hi Tech Expressions
1700 N.W. 65th Ave.
Suite 9
Plantation, FL 33133

The Learning Company
6493 Kaiser Dr.
Fremont, CA 94555

Learning Technologies
13633 Gamma Rd.
Dallas, TX 75244

MECC
3490 Lexington Ave. N.
St. Paul, MN 55126

Mindplay
Methods and Solutions
82 Montvale Ave.
Stoneham, MA 02180

Mindscape
Educational Division
Dept. S
3444 Dundee Rd.
Northbrook, IL 60062

Orange Cherry Software
Westchester Ave.
P.O. Box 390
Pound Ridge, NY 10576

Polarware
1055 Paramount Pkwy.
Suite A
Batavia, IL 60510

Soft-Kat
16130 Stagg St.
Van Nuys, CA 91406

Spinnaker
One Kendall Square
Cambridge, MA 02139

Springboard Software
7808 Creekridge Circle
Minneapolis, MN 55435

Stone and Associates
7910 Ivanhoe Ave.
Suite 319
La Jolla, CA 92037

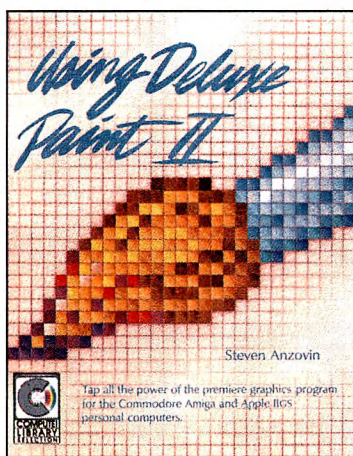
Sunburst Communications
39 Washington Ave.
Pleasantville, NY 10570

Unicorn Software
2950 E. Flamingo Rd., #B
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Weekly Reader Family Software
Optimum Resource
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Easy-to-use tutorials and ready-to-type-in programs show you how to get more from your Apple IIGs—from booting up the machine and programming in machine language to utilizing the advanced sound and graphics capabilities. Written in COMPUTE!'s clear, concise style, these books contain all the information you need to access the power of your IIGs.



Using Deluxe Paint II

Steven Anzovin

ISBN 0-87455-111-0

\$18.95

Create the most spectacular art possible on a personal computer with this comprehensive, yet understandable, guide to *Deluxe Paint II*, the state-of-the-art graphics program for the Commodore Amiga and Apple IIGs. Simple drawing skills, customizing brushes, sophisticated palettes, special color effects, tools, styles, patterning, and perspective are just some of the techniques illustrated. Learn how to use every feature of *Deluxe Paint II*, from merging foreground and background to mixing graphics and text. A COMPUTE! Library Selection.

COMPUTE!'s Guide to Sound and Graphics on the Apple IIGs

William B. Sanders

ISBN 0-87455-096-3

\$16.95

The impressive new machine from Apple holds the promise of dazzling graphics and symphonic sound—if you know how to use them. This tutorial, by the author of *The Elementary Apple IIGs*, begins by showing how to create graphics and sound using Applesoft BASIC, but it doesn't stop there. The book includes a multitude of programs, routines, and utilities with which you can open the IIGs's Toolbox, a sophisticated set of programming tools, so that you can produce truly amazing sights and sounds. A COMPUTE! Library Selection.

The Elementary Apple IIGs

William B. Sanders

\$15.95

ISBN 0-87455-072-6

A friendly, easy-to-use guide to the newest Apple computer, this book leads you through the steps of connecting the computer, loading programs, creating graphics, and writing programs. For both novice and seasoned programmers, it's an introductory text for everyone.

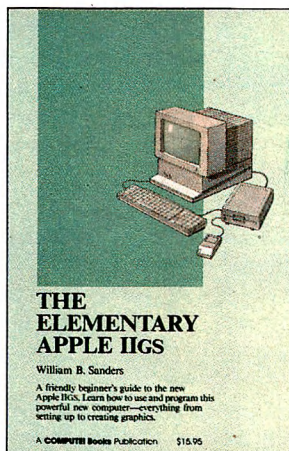
COMPUTE!'s Apple IIGs Machine Language for Beginners

Roger Wagner

\$19.95

ISBN 0-87455-097-1

The latest in a series of introductory machine language books, *COMPUTE!'s Apple IIGs Machine Language for Beginners* is a clear and concise tutorial to learning the IIGs's native language. Written by noted Apple columnist Roger Wagner, this book includes many programming examples and clear explanations that make learning 65816 machine language easy. For beginning and intermediate machine language programmers as well as those who know another machine language and want to move up to this fast 16-bit language. A COMPUTE! Library Selection.



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GEOS

The Eight-Bit Macintosh

If clothes make the man, does software make the computer? If so, GEOS—a new Macintosh-like operating system for the Apple II—offers a mighty impressive wardrobe.

The Apple Macintosh was never state of the art when it came to computer hardware. (Believe it or not, the Atari 800 has more specialized circuitry than a Macintosh Plus.) No, more than anything else, the Macintosh is a masterpiece of software sporting an upgradable, disk-based operating system; a powerful collection of graphics procedures; and, most importantly, an incredibly easy-to-use interface.

With icons (graphic symbols), windows (flexible viewing ports), and pull-down menus, the Macintosh makes loading and running programs as easy as operating a jukebox: Just point to the desired selection and press a button or, in the case of the Macintosh, double-click a mouse. This type of point-and-click interaction has become a standard for today's high-tech computers. Just take a look at the Commodore Amiga, the Atari ST, or an MS-DOS machine running *DeskMate* or *Microsoft Windows*. All of these computers use easily understood, Mac-like interfaces.

But are graphic operating systems limited only to those with enough money to upgrade to a new, more expensive computer? Not according to Berkeley Softworks. This northern California-based software company has developed *GEOS*, a complete, Macintosh-like operating system for the Apple II-series computer.

■ Randy Thompson ■

Bye-Bye DOS

GEOS replaces ProDOS and Applesoft BASIC with its own Graphics Environment Operating System. It runs on the Apple IIe, IIc, IIGS, and Laser 128.

Unlike Apple's ProDOS-BASIC combination, GEOS displays disk files as graphic images called *icons* (see the photo of the GEOS deskTop). Even disks appear as icons. Using a mouse, a joystick, or the keyboard, you move an arrow-shaped pointer around the screen. To select a disk or a file, you put the pointer over the desired icon and click (press the mouse button). Disk operations are activated by selecting options from pull-down menus that appear at the top of the screen.

Like the Macintosh, all GEOS programs use the same standard icons, menu options, and dialog boxes (a box that displays messages or requests information). Once you know how to operate one GEOS application, you know how to operate them all.

Graphic interfaces aren't for everyone, however. Purists will tell you that *real* computer users use text-based operating systems such as CP/M, UNIX, or MS-DOS; icons and windows only slow you down. And while an electronic mouse may look impressive scampering across your desktop, they force you to remove your hand from the keyboard—a counterproductive, manual diversion.

Overall, it takes less time to learn a graphics-based interface than it does to memorize the commands required by conventional operating systems, and desktop mouse maneuvers quickly become second nature. Soon you'll find reaching for the mouse is as much a reflex as hitting the Return key.

A New Product That's Old

GEOS isn't new. It has been available on the Commodore 64 and Commodore 128 for about two years and is packaged with every Commodore 64c sold today. Often referred to as the 64/128's "official" disk operating system, Commodore GEOS has acquired a large following. There's even a magazine entitled *GeoWorld* dedicated entirely to GEOS. This modest-looking publication is created entirely using GEOS products.

Even with its wide acceptance, there are those that feel GEOS is best left on the desktop. Hardly a week goes by when *COMPUTE!* Publications doesn't receive a complaint related to a Commodore GEOS product. People claim that their printer isn't supported by any of GEOS's printer drivers; their calls and/or letters are ignored by Berkeley Softworks; or they're experiencing inexplicable program bugs accompanied

by undecipherable error messages. I guess controversy comes with fame.

What You Get

GEOS's operating system, application programs, and supporting files are provided on three double-sided 5¼-inch disks. The most important of these is the GEOS boot disk. This copy-protected disk contains the main system files that all GEOS applications require. While it's possible to copy this disk, the backup will not boot GEOS—only the original can do that.



Apple IIe owners without an AppleMouse input device require GEOS's Interrupt Manager card that plugs into slot 7. This tiny card, about the size of two matchbooks, comes with the GEOS system.

Berkeley Softworks supplies a sturdy three-ring binder for GEOS's thick, but well-written manual. You also get several index dividers with the titles of future GEOS applications printed on their tabs. These dividers allow you to organize documentation for several GEOS programs into one convenient binder.

There are two full-blown application programs that come with GEOS: *geoWrite* and *geoPaint*. As the index dividers imply, more GEOS programs are on the way. If Commodore GEOS is

any indication, Apple owners can look forward to an extensive library of "geoSoftware." You must, of course, own the GEOS system before you can make use of any GEOS programs.

Up and Running

Before using GEOS, you must install it. This involves booting the GEOS disk, responding to a series of prompts, and then entering your name or the name of your institution. Besides personalizing your disk, this installation procedure works as a friendly form of copy-protection.

When you boot a GEOS application for the first time, it reads your identification information and records it as part of the application file. Once the program has been encoded with your personal information, it won't run unless it's run under *your* particular version of the GEOS system. This is definitely a nonintrusive form of copy-protection; you can still make as many copies of the program as you wish, you just can't give them away.

Probably the hardest part of getting GEOS up and running is setting up *work disks*. A work disk contains the files and applications that you want to use. The trick is leaving enough free disk space for your own files. It's best to make a separate work disk for every major GEOS application.

There's a certain art to creating work disks, getting just the right combination of fonts, desk accessories (more on these later), and application programs. In fact, the GEOS manual contains a whole chapter on the subject. For those with hard disk drives or 3½-inch disk drives, work disks turn out to be of little concern, considering the expansive storage space available.

The deskTop

When GEOS boots, it automatically loads and runs the GEOS deskTop. The deskTop is designed for manipulating disk files and running programs. It could be considered GEOS's replacement for Applesoft BASIC. Although it's not a programming language, the deskTop is where you organize, execute, delete, and (optionally) print your GEOS files.

Disks appear along the right part of the screen. The deskTop supports both ramdisks and hard disks. In fact, you can set up GEOS so that it boots from a hard disk.

Near the middle of the screen is the disk notepad, displaying the file icons for the active drive. Using your pointer, you select a file by clicking it (pointing at its icon and pressing the mouse button). You run a program by double-clicking on it (quickly pressing the

IMPROVE YOUR WITH A BRAIN

Stocks Plummet In Record Time!!! Could This Be The End of Silverware?

In what appears to be a major setback for the electronic tool industry, the market closed down over one thousand points in combined issues of *Consolidated Fork*, *SpoonTech*, and *Knives International* yesterday. The adjustment was not entirely unexpected. Analysts, however, were taken aback by the severity of the downturn.

All three major utensil companies had been seeking to diversify in recent years, and all three had experienced major setbacks.

Fork's Folly
Consolidated Fork had invested heavily in their Electric Fork, a battery powered device which stabbed steaks repeatedly until it actually hooked into the meat. It failed in market testing, when tests revealed that clumsy people who dropped the fork risk serious injury.

Spoons Go South
SpoonTech also belled up after its heavy loss incurred after its diversification into the ladle field. Tim Galusha, Chief Operating Officer, commented, "We took our lumps for trying to deviate from our specialty. We built this company on teaspoons and tablepoons. It'll be a long time until we try this sort of trick again."

Blades Bottom Out
Knives International was the third victim of yesterday's session, closing at an all-time low of one eighth cent per share, down from \$154 earlier in the day. Analysts attribute their failure to the consumer rejection of their new toy, Switchblade Silverware, designed to give people any utensil they desire at the flick of a switch.

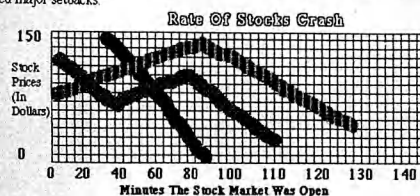
"It sure beats me," says Ross Boone, president and CEO of *Knives International*. "I thought we had a great product at a great price. I bet it was the computer traders that did us in. It certainly couldn't have been my fault."

Experts Ponder Future
Experts began to wonder if this would lead to an end of utensils for the mass public. Said expert Max Gontz, "With these three companies probably out of business, I can't conceive of anyone else being able to pick up the slack. I had to guess, I'd say we will all soon be going back eating with our hands."

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If your documents aren't winning any beauty contests, maybe your Apple IIe or IIc's problem isn't just cosmetic. Maybe what it really needs is a new brain. Like GEOS.

GEOS is the new graphic operating system that takes everything you do—including AppleWorks files—and makes them even better. Better looking. Better working. Better everything.

**It's easy when
you have the brains.**

GEOS is a completely integrated environment that runs circles around every other operating system, mostly because it starts out a lot smarter. For example, it comes with a desktop file manager, three utility programs, four applications, five desk accessories, eleven fonts and, well, you get the idea. All of which opens your Apple II to all kinds of graphically-oriented applications, like writing, painting,

merging, desktop publishing, calculating and all that other fun stuff the more expensive Apples do.

There's even a set of pop-up desk accessories, like an alarm clock, a notepad and a calculator.

Now, you'd think it would take a rocket scientist to operate a system this smart, but with GEOS, all it takes is a point and a click of your mouse. Or touch of a joystick. Or a touch of a keyboard.

OUR LOOKS TRANSPLANT.

That's it.

With GEOS, you just pull down a menu or point to an icon. Click and zap—you're there. No complicated commands. No perplexing problems.

Pretty easy, right?

Well, GEOS is easier on your eyes, too. Because the clear, sharp hi-res stuff you see on the screen is exactly what you get when it's all printed out.

Turn your ugly ducklings into prints charming.

Of course, the real beauty of GEOS is how it turns any word processing document into a work of art—in seconds. And you can do it because GEOS comes with a TextGrabber™ that's ProDOS compatible. You just pour in your AppleWorks, WordPerfect or MultiScribe text, and in less time than it takes to say, "Yikes! What a great looking document!," your text is converted into geoWrite™ 2.1, the What-You-See-Is-What-You-Get word processor that lets you center, justify, search and replace text, move blocks of copy, cut, paste graphics and select fonts of different styles and sizes right on the screen.

You still with us? Okay. Now get ready to squeeze your Apple for all it's worth.

For those really plain Jane's, we recommended a beauty treatment with geoPaint™, which lets you draw,

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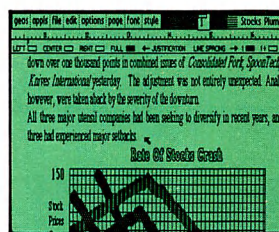
So if you think your document could do with a facelift,

geoPaint creates eye-catching graphics...

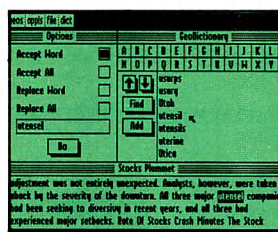
Take an ordinary AppleWorks file...



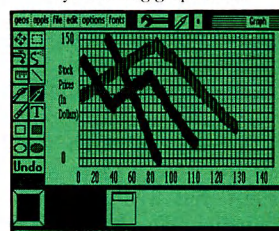
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Or if you're really out to break some hearts, a LaserWriter.™

The incredible expanding brain.

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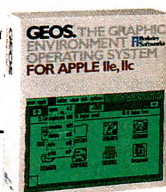
don't just do a little cosmetic surgery. Give your Apple II a brain transplant.

After all, what good are looks if you ain't got the brains to go with 'em?

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Berkeley Softworks

The brightest minds are working with Berkeley.

GEOS

GEOS Comes to Apple

In 1986, Berkeley Softworks introduced *GEOS* (Graphic Environment Operating System) for the Commodore 64. In the two years since its release, Berkeley has added a version for the Commodore 128, plus more than half a dozen other productivity applications to complement *GEOS*'s basic *geoWrite* and *geoPaint* programs. Now *GEOS* is available for the Apple II series.

Berkeley's president, Brian Dougherty, realized that a lot of Apple II owners suffered from "Mac envy," and he felt they would appreciate a similar operating system for their machines. In May 1987, he assigned four staff members to develop *GEOS* for the Apple IIe, IIc, and IIGS. As the project neared its deadline, Dougherty said the whole Berkeley staff got involved. The first copies of Apple *GEOS* were released the last week in March.

Porting any program from one system to another has its positive and negative aspects, and *GEOS* was no exception. In some instances, *GEOS* adapted more readily to Apple than to Commodore. The Berkeley team especially liked working with Apple's ProDOS file structure, which all the disk devices use. "*GEOS* for the Apple II supports a hierarchical file structure, and that's really a nice improvement," Dougherty said.

In developing applications for the Commodore, Dougherty said he had to design them to work in 64K. In the Apple world, most people have at least 128K, and that gave the Berkeley team more flexibility in designing the system. The additional memory also allowed them to add features not available on the original system.

Another positive point for the Apple is its higher resolution screen, although the unusual screen memory layout gave the design team a few headaches. "It's a 12-year-old system that was designed back when hardware was very expensive," Dougherty said. "You get a bizarre screen memory layout that was designed to save a few pennies on chip counts. Back then it was a lot of money, but today they're only saving a few pennies." The price of chips isn't a factor

now, but Apple hasn't updated the design in order to keep current machines compatible with older versions, Dougherty said.

Updating the screen quickly enough in a graphics environment was difficult with Apple's screen memory map, Dougherty said. Once that problem was solved, however, all the other applications were easy, since the operating system handles all the interfacing with the screen memory.

One aspect of *GEOS* may benefit owners of both machines: The Commodore and Apple data files are compatible. The designers regularly send files between the two machines via a serial cable. This compatibility has some interesting implications for bulletin board systems because any clip art, paint file, or other data file created on one system is directly readable by the other.

Berkeley has its own *GEOS* special interest group (SIG) on QuantumLink, a commercial bulletin board service for Commodore owners [see "Apple News & Notes" for information on QuantumLink's upcoming AppleLink section]. The SIG provides answers to technical questions, information on upgrades, patches for minor bugs, and other items of interest to *GEOS* users. Dougherty believes Apple *GEOS* users would appreciate a similar service. "We're hoping to find a telecommunications system that will allow us to offer the same kind of user support that we currently do with QuantumLink," Dougherty said.

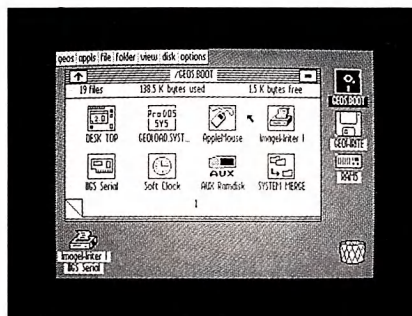
Apple IIe and IIc owners are a dedicated group, loyal to their machines, but Dougherty feels they would like to have the presentation capabilities of the Macintosh. Apple *GEOS* is a big step in that direction. It not only provides them with a graphics-based user interface, but it aims to provide high-quality presentation graphics as well. "We use the same exact bit-image fonts as the Mac does," Dougherty said. "When you print a document from Apple *GEOS* on your ImageWriter, the results are virtually indistinguishable from Mac documents."

— Tom Netsel

mouse button twice in succession). You move the file from one place to another by clicking on it, waiting awhile, and then clicking again. A ghost image of the file icon follows your pointer until you move it to the desired location and click again. By clicking while holding down the Open Apple key, multiple files can be selected and moved. Using this technique, called *dragging*, you can copy a file from one disk to another.

Unlike Macintosh and Apple IIGS *Finder* windows, the disk notepad is not movable or resizable and can display only eight files at once (the notepad's pages are too small to show any more). To view additional files, you flip the notepad's pages by clicking on a dog-eared corner or by pressing the number key corresponding to the page that you wish to see. If you want, files can be viewed by name, date, or type instead of by icon.

GEOS supports subdirectories (*GEOS* calls them folders) and displays



them as file folder-looking icons. To enter a folder, simply double-click on it. Once you've entered a folder, you can back out by clicking on the up-arrow symbol displayed at the upper left part of the disk notepad. To make searching through folders easier, there's a Browse option that displays all the folders contained on a disk.

A waste basket icon appears on the lower right part of the screen. By drag-

ging a file into the waste basket, you delete it. At the lower left corner is a printer icon. Dragging files here—can you guess?—prints your file.

Lining the top of the screen are pull-down menus, an integral part of *GEOS*. By pointing to a particular name in the menu bar and pressing the mouse button, a whole list of menu options pop down. To select a particular option, simply point at it and click. Pull-down menus make it easy to browse through a program's various options: Just hold down the mouse button and run your pointer along the menu bar. All *GEOS* application make use of pull-down menus. And some pull-down menus, such as *geos* and *appls* are always present.

Using pull-down menus, you can perform any disk operation offered by the ProDOS *Filer*. For those who prefer to keep their hands on the keyboard, *GEOS* provides keystroke shortcuts for almost all of *GEOS*'s functions.

Increase Your Programming

POWER!

COMPUTE!'s Apple IIGS Machine Language for Beginners

Roger Wagner

\$19.95

The latest in a series of introductory machine language books, *COMPUTE!'s Apple IIGS Machine Language for Beginners* is a clear and concise tutorial to learning the IIGS's native language. Written by noted Apple columnist Roger Wagner, this book includes many programming examples and detailed explanations that make learning 65816 machine language easy. For beginning and intermediate machine language programmers as well as those who know another machine language and want to move up to this fast 16-bit language. A COMPUTE! Library Selection.

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611 pages

COMPUTE! brings you two new books to help you access the power and versatility of your Apple IIGS. You'll find in-depth instructions for machine language programming as well as numerous programming examples, explanations on using the Toolbox, and ways to take advantage of the special graphics and sound features of the IIGS. Plus, like all of COMPUTE!'s books, the tutorials are clear, easy to understand, and the programs are fully tested.

Mastering the Apple IIGS Toolbox

Dan Gookin and Morgan Davis

\$19.95

The Apple IIGS merges the consumer software base of the popular Apple II machines with the advanced graphics and intuitive interface of the Macintosh. The Toolbox of the IIGS contains the routines which help the program access the powerful graphics and sound features built into this computer.

Mastering the Apple IIGS Toolbox sorts the volumes of information and documentation about the Toolbox into a concise and practical reference that makes the Toolbox far easier to use. Some of the topics covered include how to make Toolbox calls, memory management, disk use, graphics, event management, sound, and much more. This book is ideal for the intermediate- to advanced-level machine language programmer. A COMPUTE! Library Selection.

ISBN 0-87455-120-X

656 pages

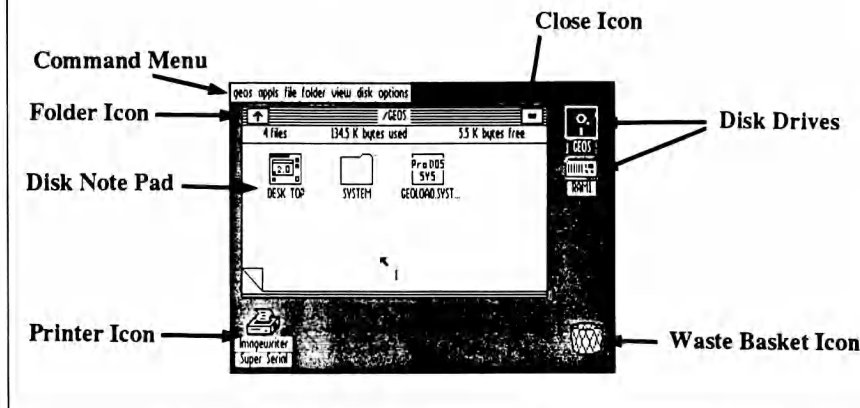


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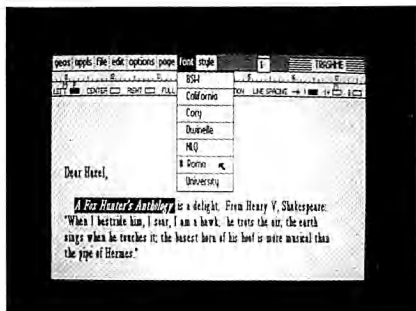
Navigating the deskTop



Here are the different components that make up the deskTop.

Probably the most useful pull-down menu available is the *appls* menu. This menu—not available in the Commodore version of *GEOS*, interestingly enough—lists all of the programs found on the current disk. Finding and running a program is as easy as selecting a menu option. Best of all, the *appls* menu is available from within all *GEOS* applications, allowing you to switch from one program to another without exiting to the deskTop (a feature Macintosh system software only recently included).

Using the deskTop, it's possible to copy, delete, rename, and run ProDOS (non-*GEOS*) files. ProDOS files have a standard and plain-looking icon that differentiates them from authentic *GEOS* files. The *GEOS*-ProDOS compatibility is one-way: Although ProDOS files may be accessed via *GEOS*, not all *GEOS* files may be accessed via ProDOS.



GeoWrite

Modeled after *MacWrite*, *geoWrite* is a multifont, WYSIWYG (What You See Is What You Get) word processor with graphics capabilities that uses either the mouse or the keyboard's arrow keys to position the cursor. You can drag the pointer to select text, double-click to select a word, or Shift-click (press the Shift key while clicking on the mouse

button) to select text from the cursor position to the pointer location.

Formatting options, such as line spacing and margin settings, are adjusted using a ruler at the top of the screen. Using your pointer, you simply click on icons in the ruler to adjust your text. Left, right, centered, and justified text are all supported by *geoWrite*. All changes to the text's format—or changes in the characters' font and style, for that matter—is immediately reflected on the screen.

To move through your document, you simply move the mouse pointer to the very top or bottom of the screen to scroll text down or up, respectively. *GEOS* doesn't provide scroll bars to move through text.

Several well-designed fonts come with the *GEOS* system, and with *GEOS*'s flexible design, fonts can be added or removed simply by copying font files to or deleting them from your work disk. Fonts can be adjusted by making them bold, italic, underlined, outlined, superscript, or subscript (see the sample font printout). Styles may be combined, so it's possible to have bold and outlined characters.

GEOS's fonts look good on the computer screen, but on paper they lack clarity. For special flyers or snazzy party invitations, you'll appreciate *GEOS*'s fancy fonts. But if you want readable letters and school reports, stick to *geoWrite*'s draft mode, which prints documents using the printer's built-in font.

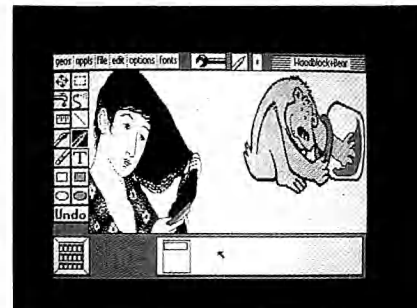
For truly high-quality output, *GEOS* provides *geoLaser*, which makes it possible to print *geoWrite* documents on an Apple LaserWriter printer. This way, you can take advantage of the LaserWriter's near-typeset-quality look.

You aren't limited to using only text in *geoWrite*. You can incorporate graphics from *geoWrite*'s sister pro-

gram, *geoPaint*. Graphics can be inserted anywhere, but text cannot flow around them. Combine *geoWrite* with *geoPaint* and *geoLaser*, and you've got a simple desktop publishing system.

Multiple fonts and graphics support have their drawbacks: *geoWrite* is very slow. Fast typists will quickly outrun the program. Moving from one screen of text to another takes about 15 seconds. Running the program from a ramdisk, however, increases the program's speed considerably.

Surprising pluses to the *geoWrite* program are *geoSpell* and *TextGrabber*. Using a dictionary containing over 28,000 words, *geoSpell* checks the spelling in your *geoWrite* documents. *TextGrabber* lets you take files from popular word processors and convert them to *geoWrite* format.



GeoPaint

As you might expect, *geoPaint* strongly resembles the classic Macintosh art program, *MacPaint*. Like *MacPaint*, *geoPaint* works in black-and-white only; Apple *GEOS* doesn't support color in any of its programs.

With *geoPaint*, you can paint in any of 32 patterns with one of 32 different brush strokes. All of the program's drawing tools are displayed as icons along the left side of the screen—just a click away. If you like, these icons (collectively known as the *toolbox*) can be turned off so you can see more of the actual drawing.

The *geoPaint* toolbox offers 14 different drawing tools: Pencil; Eraser; Paint Brush; Air Brush; Lines; Squares; Rectangles; Circles; Ellipses; Mover; Ruler; Faucet (a fancy name for a fill option); Text; and Editing Region. Below the toolbox is the all-important Undo option. Not included in the toolbox, but accessible from a pull-down menu, is a pixel-edit option that zooms in on any area of your drawing for detailed work.

With the Editing Region tool, you can select any rectangular section of the screen to edit. Just click in one corner, move your pointer to the position of the opposite corner, and click again. Once selected, you can mirror, rotate, move, invert, copy, or clear that section of the screen.

=== UNIVERSITY ===

University 6 point

University 10 point

University 12 point

University 14 point

University 18 point

University 24 point

=== DWINELLE ===

Dwinelle 18 point

=== NLQ ===

NLQ 18 point

=== STYLES ===

Plain, Bold, *Italics*

Outline, Underline

Super^{script}, Sub_{script}

=== BSW ===

BSW 9 point

=== CALIFORNIA ===

California 10 point

California 12 point

California 14 point

California 18 point

=== ROMA ===

Roma 9 point

Roma 12 point

Roma 18 point

Roma 24 point

=== CORY ===

Cory 12 point

Cory 24 point

GEOS provides many different fonts. Here are just a few.

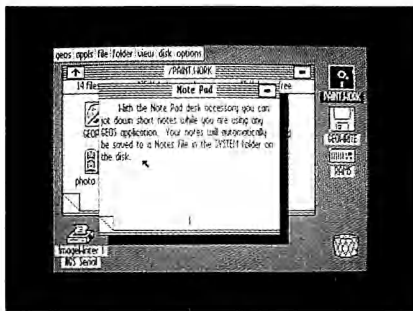
One of geoPaint's most exceptional features is its ability to handle text. Using the Text tool, you can enter characters into your painting. Like the Editing Region tool, you box the area of the screen with which you wish to work. This box becomes a tiny word processor window into which you can enter text. Automatic word-wrap and all the different fonts and styles offered

geoWrite are provided by geoPaint's mini-editor. You can even paste geoWrite text into geoPaint in the same way that you can paste geoPaint graphics into geoWrite.

Because your artwork can span an $8\frac{1}{2} \times 11$ inch page, geoPaint displays only a small section of the painting at a time. The Mover tool lets you scroll to different sections in your document. To make more radical leaps, just point to and click the desired location on a small page icon that appears near the bottom of the screen.

An awkward item to note about both geoPaint and geoWrite is the lack of a quit-without-save option. In fact, there is no save option, per se. Your document is *always* saved for you. Changes made to a file are permanent. The best advice is to always work on a copy of a file. If you make any drastic mistakes, you can revert to an older version.

One of the trademarks of a graphic interface is its insatiable desire for RAM, and GEOS is no exception. To work within the limits of 128K, GEOS relies heavily on disk space. Graphics data, and even program code, is often stored temporarily to disk, where it's loaded back into memory when needed. Unfortunately, this method leads to slow-running programs. If you have the extra memory, running programs from a ramdisk can really speed things up.



Accessories

Desk accessories are small programs that are run from the *geos* pull-down menu. GEOS provides several useful desk accessories: Note Pad, Calculator, Photo Manager, and Text Manager. Desk accessories can be run at any time—even while using a program like geoWrite.

The Note Pad lets you enter text onto a handy, electronic notepad. Note Pad files are kept on disk for later viewing and/or editing. The Calculator is always useful for impromptu calculations.

The Text Manager and Photo Manager give you the ability to store, view, and select text and graphics for pasting into GEOS applications, which brings up another point: GEOS provides complete compatibility between its pro-

grams. Any text or graphics cut from one application can be pasted into another. This makes GEOS a fully integrated operating system.

Future Support

An operating system is nothing without supporting programs. And Berkeley Softworks is promising many new titles. Applications already slated for release are: *geoProgrammer*, an assembler for those wishing to create their own GEOS programs; *geoPublish*, a full-featured desktop publishing program; a spreadsheet program entitled *geoCalc*; the database *geoFile*; and *DeskPack* and *FontPack*, two packages containing extra desk accessories and fonts designed to spice up your work disks.

Support shouldn't come from Berkeley Softworks alone. Ideally, the GEOS standard will be adopted by other software and hardware developers. Again, if Commodore GEOS is any example, third-party developers will be happy to jump on the GEOS bandwagon.

The Common Computer

GEOS isn't important just for what it offers the Apple II, but for what it offers all computers: compatibility. With three different versions currently available—the Commodore 64, Commodore 128, and now the Apple II—users familiar with GEOS on one computer can easily use it on another. All versions of GEOS are virtually identical. As Brian Dougherty, the president of Berkeley Softworks states, "Our intent is to create a common operating system and application platform for different types of computers."

This type of compatibility is important to schools, which often have several different brands of computers, but don't have the time to teach students how to use them all.

GEOS will also make Apple II computers less intimidating to new computer users. By replacing confusing commands with friendly icons and easy-to-use pull-down menus, GEOS makes using your computer fun as well as simple. Berkeley Softworks believes this will make the program appealing to home and small-business users, as well as educators using computers in the classroom.

Is GEOS for you? Well, if you prefer an easy-to-use and understand operating system that provides the convenience of a Macintosh at a fraction of the cost, the answer is *yes*. If you're an experienced computer user who's satisfied with *AppleWorks* and other keyboard-oriented programs, the answer is *no*. But whatever your personal opinion may be, GEOS is a remarkable and important piece of software. **aa**



Buyer's Guide to Adventure Games

You don't have to be an Indiana Jones fan to enjoy adventure games, for the plots of these interactive stories cover everything from fantasies of knights and dragons to futuristic visions of robots and lasers.

Adventures fall into two basic types: the classic adventure and the role-playing game.

In classic adventures—whose name is derived from Crowther and Woods' mainframe game, *Adventure*—you type in a few words to tell the program what you want to do. Text or pictures reveal the current location, situation, or response to your latest action. The emphasis is on solving logical puzzles. Unraveling one usually nets you an object needed to solve yet another puzzle or opens an entrance to fresh regions. In these games, a *parser* interprets your commands; the better the parser, the easier it is to communicate your intentions to the program.

Inspired by *Dungeons and Dragons*, role-playing games (RPGs) are distinguished by their focus on attributes—strength, health, and so on—which determine your capabilities. Combat is also stressed, and most RPGs offer animated action and sound effects. Puzzles play a part, but are the sort whose answers are typically found through exploration rather than pure logic.

At the end of each product description is a brief synopsis of the game's skill level and, in the case of the classic adventure games, the quality of the program's command parser.



Shay Addams

Text Adventures

Adventure

Electronic Arts
1820 Gateway Dr.
San Mateo, CA 94404
\$14.95

Crowther and Woods' landmark game is part of *Golden Oldies*, a collection of classic computer and videogames. In it, you explore the Colossal Cave, seeking treasure while fending off dwarves.

Advanced skill level; good parser.

Beyond Zork

Infocom
125 Cambridge Park Dr.
Cambridge, MA 02140
Apple II, \$44.95
Apple IIcs, \$49.95

In a land where magic is waning, your goal is to find the fabled Coconut of Quendor. Besides solving logical puzzles, you'll engage in combat with monsters and such to develop traits like those in RPGs. It's the first Infocom game to boast automapping and other exotic features.

Advanced skill level; excellent parser.

Border Zone

Infocom
125 Cambridge Park Dr.
Cambridge, MA 02140
\$39.95

This spy thriller is divided into three separate games. In each one, you play the part of a different character in the same evolving story: a businessperson who meets a spy, then the spy who's trying

to prevent an assassination, and finally the assassin. Certain puzzles must be solved within time limits, or you'll be arrested or killed. Clues are built in.

Intermediate skill level; excellent parser.

Bureaucracy

Infocom
125 Cambridge Park Dr.
Cambridge, MA 02140
\$39.95

Written by Douglas Adams of *Hitchhiker's Guide* fame, this story pokes fun at the frustrating aspects of dealing with banks, ticket agents, and so on. You spend most of your time trying to track down your mail, which is being forwarded to everyone in your new neighborhood, so you can straighten out an error with your bank account.

Advanced skill level; excellent parser.

Goldfinger

Thunder Mountain
3444 Dundee Rd.
Northbrook, IL 60062
\$9.95

As James Bond, you'll chase the larcenous Goldfinger from Europe to Kentucky to stop him from exploding an atomic bomb at Fort Knox.

Intermediate skill level; weak parser.

Hollywood Hijinx

Infocom
125 Cambridge Park Dr.
Cambridge, MA 02140
\$39.95

Unless you find all the wacky "treasures" in a Hollywood mansion, the will that leaves the house and a film studio to you will be declared invalid. A clever spoof on the treasure hunt theme, *Hollywood Hijinx* has a surprise ending.

Novice skill level; excellent parser.

Indiana Jones in Revenge of the Ancients

Thunder Mountain
3444 Dundee Rd.
Northbrook, IL 60062
\$39.95

As Jones you'll crack that famous bullwhip to solve several puzzles—and wrack your brains on the rest—in a quest to recover an Aztec talisman from Nazis deep in the Mexican jungle.

Advanced skill level; weak parser.

Lurking Horror

Infocom
125 Cambridge Park Dr.
Cambridge, MA 02140
Apple II, \$34.95
Apple IIGs, \$39.95

An original tale of horror set on a college campus, where you must stop a mad professor's experiments with alchemy and black magic from wreaking havoc on the world. The IIGs version has sound effects.

Intermediate skill level; excellent parser.

The Mist

Thunder Mountain
3444 Dundee Rd.
Northbrook, IL 60062
\$9.95

This horror story, based on Stephen King's novella, tells of a town invaded by giant insects. Your task is to save your son from the fiends, which means getting to the bottom of the mystery.

Intermediate skill level; weak parser.

Sherlock: Riddle of the Crown Jewels

Infocom
125 Cambridge Park Dr.
Cambridge, MA 02140
\$39.95

Instead of playing Sherlock, you become Dr. Watson, out to nab master criminal Moriarty and recover England's crown jewels. A sprawling London landscape means extra mapping, but built-in clues are a boon.

Intermediate skill level; excellent parser.

Star Trek I and II

Simon & Schuster Software
A Gulf + Western Company
One Gulf + Western Plaza
New York, NY 10023
\$39.95 each

Star Trek I asks you to search 10 systems and 50 planets to find Sulu, who is missing in action. Overlapping windows present text reports on various ship functions, crew communications, and so on. The sequel, with more eloquent prose and superior puzzles, uses a traditional system: Text scrolls up the screen, and the input prompt is at the bottom. In it, you have to find food to keep the crew from starving, which requires solving the enigma of a strange alien culture.

Intermediate skill level; weak parser (*Star Trek I*), good parser (*Star Trek II*).

Stationfall

Infocom
125 Cambridge Park Dr.
Cambridge, MA 02140
\$39.95

Science fiction again, but a humorous variety that keeps you smiling while attempting to find what happened to the crew of a space station. Floyd, a precocious robot, assists your efforts.

Intermediate skill level; excellent parser.

A View to a Kill

Thunder Mountain
3444 Dundee Rd.
Northbrook, IL 60062
\$9.95

A James Bond story that moves from Paris, to London, to California as you strive to prevent the villain from triggering an earthquake that will wipe out Silicon Valley.

Intermediate skill level; weak parser.

Wishbringer

Infocom
125 Cambridge Park Dr.
Cambridge, MA 02140
\$14.95

An interactive fairy tale whose goal is to find a magic stone and rescue a black cat from the Evil One. This is a perfect first adventure. Little mapping is required, puzzles are relatively easy, and after finding certain objects, you can make wishes that conjure up easier solutions to the program's puzzles.

Introductory skill level; excellent parser.

Zork I-III

Infocom
125 Cambridge Park Dr.
Cambridge, MA 02140
Zork I, \$14.95
Zork II, \$39.95
Zork III, \$44.95

Originally a mainframe game, *Zork* and its sprawling Great Underground Empire were divided into three sections when converted for micros. Though each game's goal is to acquire objects that allow

you to reach the succeeding game, they may be played in any order.

Advanced skill level; excellent parser.

Graphic Adventures

Crimson Crown

Polarware
830 Fourth Ave.
P.O. Box 311
Geneva, IL 60134
\$17.95

You have a pair of sidekicks on this quest: Sabrina provides magic, Prince Erik has a strong sword arm, and both help solve many puzzles as you try to wrest the Crimson Crown from a vampire. With 128K RAM, graphics may be viewed in detailed, double high resolution (true of all Polarware games).

Novice skill level; very good parser.

Dondra—A New Beginning

Spectrun Holobyte
2061 Challenger Dr.
Suite 325
Alameda, CA 94501
Apple II, \$39.95
Apple IIGs, \$49.95

Innovative special effects and excellent cartoon-style pictures make this a standout—especially on the Apple IIGs. After retrieving the Crystal Prism, you'll be able to use your character in a series of projected sequels.

Intermediate skill level; good parser.

Gunslinger

Datasoft
19808 Nordhoff Pl.
Chatsworth, CA 91311
\$29.95

Saddle up and ride into the sunset as an ex-Texas Ranger determined to rescue a pal from a Mexican jail. Relatively simple graphics, but a good game for beginners.

Introductory skill level; weak parser.

King's Quest I-III

Sierra
P.O. Box 495
Coarsegold, CA 93614
Apple II, \$44.95 each
Apple IIGs, \$49.95 each

With joystick, keyboard, or mouse, you maneuver a fully animated character through vividly portrayed 3-D illustrations that give the program a high quality, TV-cartoon appearance. Some puzzles are action oriented, but not as tricky as arcade games. In the first *King's Quest*, your goal is to become King of Davenport, who sets out to find a queen in the second game. You play their son in the third story, striving to escape an evil wizard and return home. (A fourth may be out by now, in which your character is a woman.)

Intermediate skill level; good parser.

Maniac Mansion

Activision
2350 Bayshore Frontage Rd.
Mountain View, CA 94043
\$34.95

From Lucasfilm Games, this humorous horror story lets you switch back and forth between three characters searching a haunted house for a missing girl. Some puzzles require several characters to act in unison. The animated characters are joystick

controlled, and cartoon-style special effects enhance the action.

Intermediate skill level; good parser.

Oo-topos

Polarware
830 Fourth Ave.
P.O. Box 311
Geneva, IL 60134
\$17.95

After your space ship crashes on an alien planet, you must round up the ship's scattered pieces so you can deliver a vital vaccine to a distant colony. The maze is a good one for learning purposes.

Intermediate skill level; very good parser.

Space Quest

Sierra
P.O. Box 495
Coarsegold, CA 93614
Apple II, \$44.95
Apple II, \$49.95

Using the *King's Quest* system, this science fiction comedy stars you as a janitor in space. Aliens attack and steal a powerful weapon that you must recover. The journey spans several planets, where events are often as funny as they are frustrating.

Intermediate skill level; good parser.

Talisman

Polarware
830 Fourth Ave.
P.O. Box 311
Geneva, IL 60134
\$19.95

Finding the magic talisman needed to save ancient Persia from a host of plagues is no easy task, but you have a helpful sidekick named Abu to assist you with several puzzles.

Advanced skill level; good parser.

Role-Playing Games

Alternate Reality

Datasoft
19808 Nordhoff Pl.
Chatsworth, CA 91311
The City, \$30
The Dungeon, \$40

A projected series in which each part of the fantasy land is connected to another area that's on a different disk. After entering a door to the next area, you just insert the appropriate disk. So far, only *The City* and *The Dungeon* disks are available. Go for the latter, since it has a definable goal—to escape the four mazes beneath the City—while the first is merely a mapping and character-building exercise.

Intermediate skill level.

AutoDuel

Origin Systems
136 Harvey Rd.
Building B
Londonderry, NH 03053
\$50.00

This one-character, post-nuclear war scenario combines arcade challenges with a mission to nab a major crime lord. Cars can be customized with machine guns, lasers, and other weapons before entering the arena to fight for cash prizes; or you can pursue outlaws on the roads.

Novice skill level.

Bard's Tale I-III

Electronic Arts
1820 Gateway Dr.
San Mateo, CA 94404
Bard's Tale I, \$45.00
Bard's Tale II and III (not available for IIGs), \$50.00

In *Bard's Tale I*, your six-man team maps and mauls its way through a series of dungeons to find and exterminate Mangar the Dark. Top-notch graphics, spot animation, and a varied magic system make this a winner. The second *Bard's Tale* is weaker, with overly convoluted puzzles and time-limit puzzles that wipe out your party if you fail. The third version offers the best story, with more extensive text, more logical puzzles, and enhanced graphics as well as a lengthy quest through time and space.

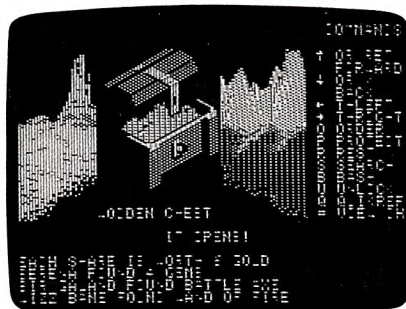
Advanced skill level.

Deathlord

Electronic Arts
1820 Gateway Dr.
San Mateo, CA 94404
\$49.95

Japanese magic spells and weapons distinguish this from other RPGs. Your six-person team must find and slay an outcast wizard in the land of Khodan, sailing to scattered islands and delving into one dungeon after another (157 levels in all). Customizable macros simplify giving orders.

Advanced skill level.



Might and Magic

Might and Magic

New World Computing
14922 Calvert St.
Van Nuys, CA 91411
\$54.95

Instead of tracking down an evil wizard, your party of six searches the land of Varn for the secret of the Inner Sanctum. Dungeons, towns, and castles are lushly illustrated, and the outdoor mazes include forests, deserts, and frozen wastes. An original magic system, alternate solutions to many puzzles, and a surprise ending earned this one *QuestBusters'* "Best Quest of 1987" Award.

Intermediate skill level.

Moebius

Origin Systems
136 Harvey Rd.
Building B
Londonderry, NH 03053
\$60.00

A one-character "swords and sorcery" scenario with an Oriental setting, *Moebius* presents combat in the style of a Karateka: Your character chooses from an array of sword and kung fu attacks. The unique magic system is refreshing, and some spells are used to solve puzzles while you journey through the realms of Earth, Air, Fire, and Water to

recover a missing Orb from a renegade monk. Each realm is a separate scenario that loads only after the previous one is completed.

Intermediate skill level.

Phantasie I-III

Strategic Simulations
1046 N. Rengstorff Ave.
Mountain View, CA 94043
\$39.95 each

This series features convenient onscreen mapping of the dungeons and is menu driven (no complex commands to memorize). In *Phantasie I*, your six-person team seeks the Nine Rings of Power and the death of the Dark Lord. But the Dark Lord escapes and creates havoc in the second game. Finally, you confront him in *Phantasie III*, which uses a new combat system that emphasizes battles more than the logical puzzles stressed in the others.

Intermediate skill level.

Questron I and II

Strategic Simulations
1046 N. Rengstorff Ave.
Mountain View, CA 94043
\$49.95 each

The first game is old, but still has one of the best endings in any game ever. Your character tracks down the Book of Evil held by a malevolent magician. A joystick interface simplifies selecting commands from an onscreen list, and the magic system is easy to learn. In the sequel, you've got to destroy the Book of Evil before it destroys you. New features in *Questron II* include 3-D views of monsters and automapping of the mazes.

Intermediate skill level.

Realms of Darkness

Strategic Simulations
1046 N. Rengstorff Ave.
Mountain View, CA 94043
\$39.95

A text parser enables you to type in answers to some puzzles while your eight-man team fights their way through 30 dungeons and assorted forests and towns to complete five quests of increasing difficulty. An original magic system and some unusual maze configurations make up for the program's weak graphics.

Intermediate to Advanced skill level.

2400 A.D.

Origin Systems
136 Harvey Rd.
Building B
Londonderry, NH 03053
\$39.95

Here's a science fiction story without a space ship! In a city run by robots that conquering space invaders left behind, you've got to free the people by shutting down the master computer. It's a one-character game that requires almost no mapping.

Intermediate skill level.

Ultima I-V

Origin Systems
136 Harvey Rd.
Building B
Londonderry, NH 03053
Ultima I and II, \$40.00
Ultima III-V, \$60.00

The first and second *Ultimas* are one-character games. In the first, you must fulfill minimeissions for several kings while tracking down the evil wizard



Ultima V

Mondain. (The main king is Lord British, who appears in each *Ultima*.) The second introduces Time Doors, a convoluted puzzle and transportation system, used in later *Ultimas*, and pits you against Mondain's prize pupil. In *Ultima III* your six-member party is out to nail a descendant of fiends from I and II. *Ultima IV* is a major departure from the standard RPG, as you quest to *become* something (an Avatar) rather than to destroy an evil wizard. *Ultima V* is set in the same game world, where your goal is to rid the land of the Shadowlords and rescue Lord British. All but the first *Ultima* features excellent animation and sound effects.

Ultima I is a good game for beginners; the rest are advanced.

Wasteland

Electronic Arts
1820 Gateway Dr.
San Mateo, CA 94404
\$49.95

After a nuclear war, your team of seven Desert Rangers face mutated monsters, robots, and outlaw bikers while solving a series of mini-missions in the American Southwest. In doing so, you discover the program's main goal. Many puzzles are the logical type usually found in text games, and combat involves an array of machine guns, rockets, and other gear. *Wasteland* is the best post-nuclear war scenario yet.

Intermediate skill level.



Wasteland

Wizardry I-IV

Sir-Tech Software
P.O. Box 245
Charlestown Ogdensburg Mall
Ogdensburg, NY 13669
\$59.95 each

In *Wizardry I*, your six fighters and wizards plunge into a ten-level dungeon to defeat the evil wizard Werdna and retrieve an amulet. A well-balanced game system with weak graphics, *Wizardry* insists that you use characters from the first game in the next two titles, which are similar in play. *Wizardry IV* is a "mirror maze" of the first game, casting you as Werdna in a bid to reclaim the amulet. Your party consists of monsters, and you fight adventurers while solving unusually good logical puzzles. Intense mapping in all.

Expert skill level.

Wizard's Crown I and II (Eternal Dagger)

Strategic Simulations
1046 N. Rengstorff Ave.
Mountain View, CA 94043
\$39.95 each

Wizard's Crown resembles war games in which you must make an array of tactical decisions for each of the six characters in your team. The first is a quest for a crown that must be returned to a group of magicians; the second takes you to Demon's World to prevent the demons from invading our world.

Advanced skill level.

Shay Addams coauthored the book *The Greatest Games: The 93 Best Computer Games of All Time* (COMPUTE! Books) and is the publisher of *QuestBusters: The Adventurers' Journal*. **aa**

COMPUTE!'s Apple Applications Disk is the easy way to enjoy the programs from this issue.

The 5¼-inch floppy disk

- Saves hours of typing time
- Loads quickly into the Apple II+, IIe, IIc, and IIGs personal computers
- Works under both DOS 3.3 and ProDOS
- Eliminates errors caused by typing mistakes
- Provides *all* the programs found in the issue, along with additional supporting data files and even source code

Here are just some of the programs that you'll find on the August Disk:

Galaxy Defender. Prepare for the worst as hostile aliens descend from the sky. Only you can save the galaxy from the impending invasion.

Sounding Board. Get machine language-quality sounds from BASIC with a sound design program that lets you draw sounds onscreen. Three predesigned sounds are included on the disk.

The Photo Exchange. Exchanging *Newsroom* photo files with *Print Shop* graphics is fast and easy with this user-friendly utility.

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SOUNDING BOARD

Jenny Schmidt

Generating a wide variety of sounds from your Apple II can be very frustrating. In Applesoft you're limited to the bell character (Control-G) or some very dull speaker-clicking via the PEEK(-16336) command. Assembly language broadens your possibilities, but you have to know what you're doing. Even then, to obtain predictable results takes patience, time, and a lot of bit fiddling.

The "Sounding Board" program makes things easy by giving you complete control over a sound's pitch, duration, and envelope (volume of a sound through time). The program generates *sound tables* which may be heard using Sounding Board's Play option or played in your own programs through use of "VTone"—the accompanying machine language routine that adds sound commands to BASIC.

Probably the best thing about this program is that you design your sounds visually. Through use of the keyboard, you stretch and shrink the sound's envelope by stretching and shrinking a line that's displayed on the computer screen. Options such as setting sustain and noise levels allow you to shape the sound even further. With some thought and a little experimentation, you can design sounds that mimic musical instruments or just make unusual noises.

The Sound of Typing

To use Sounding Board, you need to enter and save Programs 1 and 2. Program 1 is the sound editor. It is written in BASIC. Accurate typing is important here, so be sure to use the "Apple Automatic Proofreader," found elsewhere in this issue, when typing in Program 1. Save this program as **SOUND.EDITOR**.

Program 2, "VTone," is the heart of Sounding Board, providing all the key machine language routines that are used to produce sound. You must enter this listing using "Apple MLX," the machine language entry program listed elsewhere in this magazine. Before loading Apple MLX, type

HIMEM: 35840

When you run Apple MLX, you'll be asked for the starting and ending addresses of the program that you're about to enter. For Program 2, answer these prompts with

STARTING ADDRESS? 9400

ENDING ADDRESS? 953F

After Apple MLX displays the options menu, choose E to enter the program and then type in your starting address. (If you're just beginning to enter VTone, type **9400**, the first ad-

dress in the listing.) Enter the data and save the file with the filename **VTONE** to the same disk as Program 1.

Note: It's very important that you save this file as VTONE; Program 1 expects to find Program 2 saved with that filename.

Making Noise

You don't need to know how the Apple II produces sound to use Sounding Board, but knowing how the program generates different tones will make it easier for you to create the sounds you want.

Sounding Board's sound synthesis process relies on the use of sound tables. A sound table is a list of numeric data representing the *volume envelope* for a sound. A volume envelope is simply the loudness of a sound over time. For example, consider how a piano note is created: The player presses a key and a hammer strikes a stretched string. The hammer imparts energy to the string, and the string starts vibrating. These vibrations are the sound you hear. The sound begins loud, but over time the vibrations become weaker and weaker, and the sound becomes softer and softer until it's no longer heard.

If you drew a graph of the volume level of a piano note over time, it would look somewhat like the figure shown below. This graph is a pictorial representation of the volume envelope for a piano note. The volume envelope is a very important component in determining the characteristics of a sound.

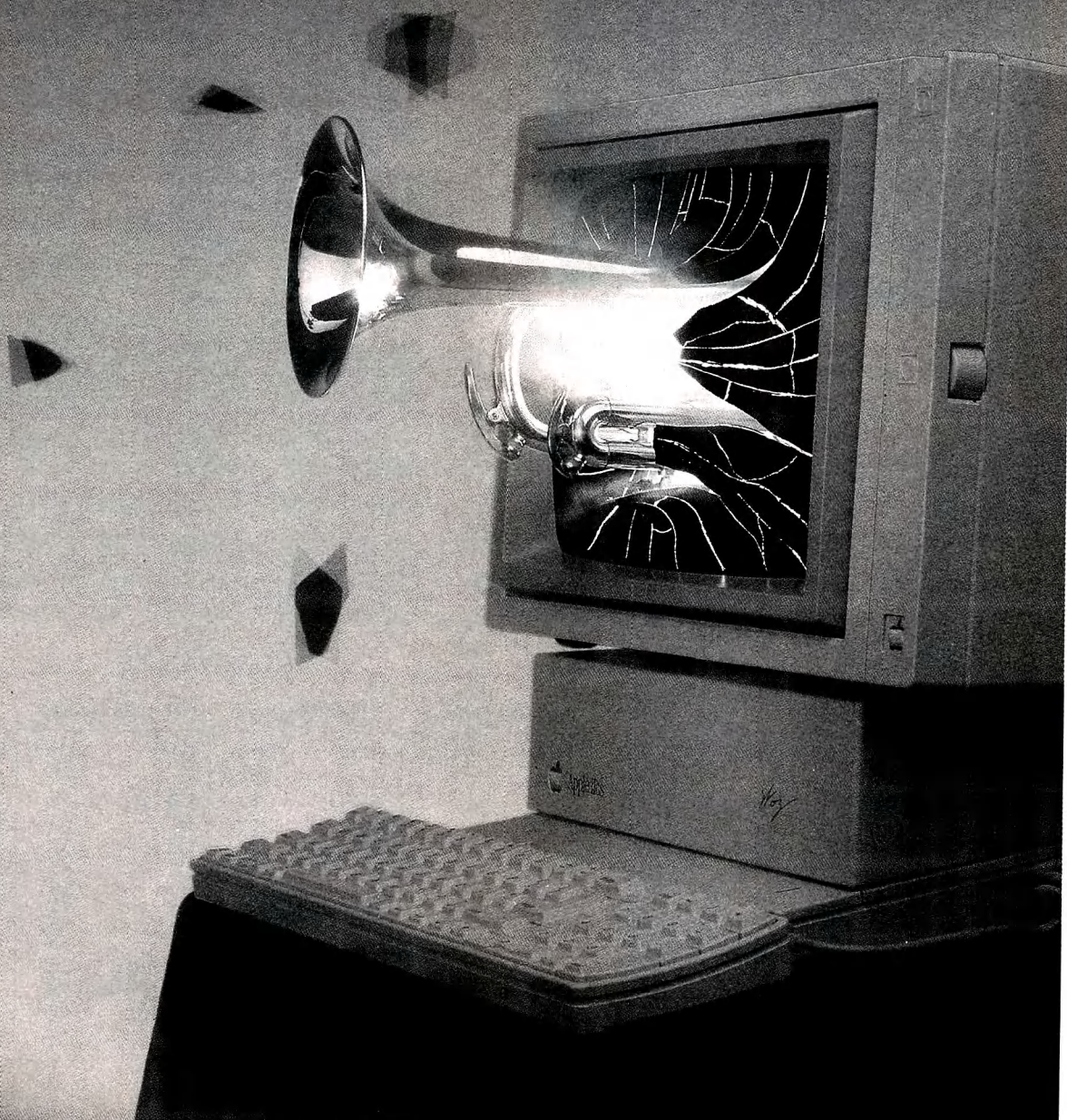
With Sounding Board, you actually *draw* the sound's volume envelope on the computer screen. When you're done, the program calculates a sound table for this envelope. Then you can "play" the sound table, hear what it sounds like, and if you like, go back and edit it until you get it just right.

Becoming an Audio Artist

To begin designing sounds, enter **RUN SOUND.EDITOR**. After a short while, the program's main screen appears (see screen shot). The line in the middle of the screen illustrates the current envelope. Using the I, J, K, and M keys, you can change this line into a picture of the sound you want.

The computer screen acts as a graph of the sound's envelope, with the volume recorded vertically and the time recorded horizontally. The higher the line is, the louder the sound's volume. Time runs left to right across the screen. Near the bottom of the screen, above the menu, is a series of numbers. These numbers mark time in milliseconds.

Get machine-language-quality sounds from BASIC with "Sounding Board"—a sound design program which lets you draw sounds onscreen. Works on the Apple IIe, IIc, or IIGSGS in either DOS 3.3 or ProDOS, and on the Apple II+ with DOS 3.3.



The line is actually made up of 32 connecting segments. Think of the line as a long, hinged ruler that you can push and bend into shape. A square on the screen indicates your current position on the line. The J and K keys move this square cursor left and right along the line. When you come to the end of the line, the cursor wraps around to the other side of the screen. The I and M keys pull the line up and down at the cursor's current position.

The Menu

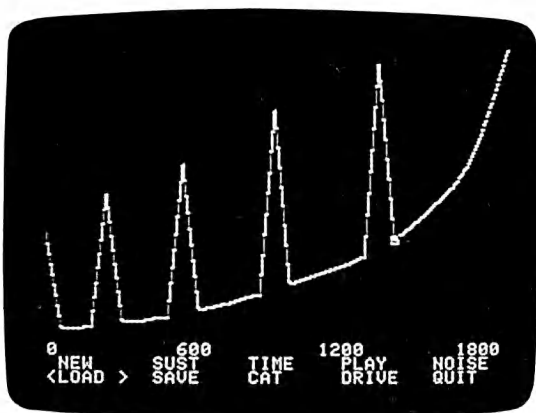
Sounding Board's menu appears below the graphing area. Options include:

NEW	SUST	TIME	PLAY	NOISE
LOAD	SAVE	CAT	DRIVE	QUIT

You select options by pressing the left and right arrow keys. Brackets outline the current option. Press Return to activate the selected menu option.

NEW. This option erases the current envelope and returns it to a straight line.

SUST. Although you can create many different sounds by changing the envelope, there are other options that affect the sound: SUST is one of them.



The main screen of "Sounding Board" shows the sound envelope above and lists the menu options below.

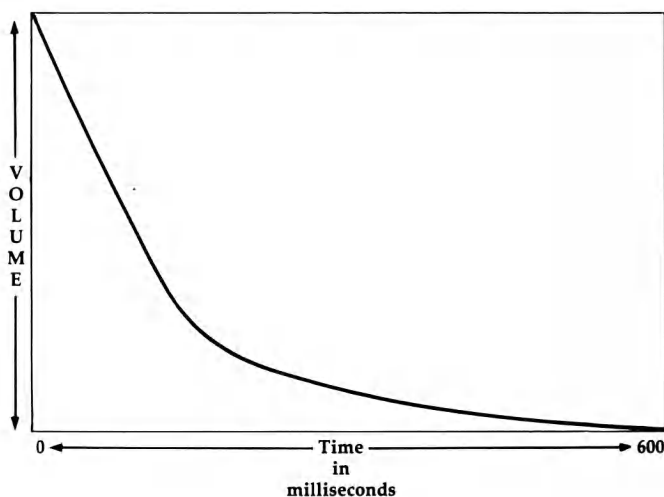
The SUST option allows you to indicate a *sustain level* in the envelope. The sustain level is a constant volume that lasts for nearly all of the sound's duration. For example, consider an oboe. When an oboe plays a note, the volume builds quickly and then stays at its sustain level. Finally, the player stops and the volume drops off quickly. The length of time that the volume is sustained varies with the duration of the note.

When you select SUST, a caret symbol (^) appears at the bottom of the envelope graph, just above the time scale. Each time you select SUST, the caret moves one space to the right. Keep moving it until it reaches the point in time where you want the sustain to occur. Now when you play a note, the sustain occurs at the time you indicated and at the current volume of the envelope.

The sustain lasts for the remainder of the note's normal duration, and then the rest of envelope is played. As you can see, setting a sustain causes the note to be slightly longer than the specified duration. The length of the note is actually the duration plus the remainder of the envelope. Since sustains are usually used with very short envelopes, the extra length is seldom noticed.

To remove a sustain, continue to select SUST until the caret moves off the screen.

VOLUME ENVELOPE FOR PIANO NOTE



TIME. If you look at the piano envelope in the figure shown above, you'll notice that it spans 600 milliseconds. When you first run SOUND.EDITOR, the envelope's time span defaults to 100 milliseconds. To increase or decrease the envelope time, select this option. You may choose any time between 40 and 2100 milliseconds. Generally, shorter time scales make for more percussive sounds. The time scale at the bottom of the graph reflects your changes.

PLAY. Once you've drawn an envelope using the I, J, K, and M keys, you'll want to hear how it sounds. With this option, you can do just that.

When you select PLAY for the first time, you must wait while the program calculates the envelope's new sound table. Then you're asked to enter a sequence of notes. Each note is composed of a pitch value and a duration value. These values can range between 1 and 255. The smaller the pitch value, the higher the pitch. The larger the duration value, the longer the note's duration.

Every note must be entered onto one line. To separate the pitch from the duration and to separate each note, you must use an exclamation point (!). So your entry for two different notes would appear as pitch!duration!pitch!duration. For example, the following sequence plays the popular *do-re-mi* arpeggio (otherwise known as the first three notes in a C-major scale: C, D, and E):

ENTER SEQUENCE: 76!100!63!100!52!100

Each note here is of equal duration (100). The Note Values Table lists the pitch values for notes A2-F5 (A in the second octave through F in the fifth octave), where C4 represents middle C. A pitch value of 0 indicates a rest (no

NOTE VALUES

Second Octave		Third Octave		Fourth Octave		Fifth Octave	
Note	Value	Note	Value	Note	Value	Note	Value
		C	188	C	76	C	17
		C#/Db	181	C#/Db	69	C#/Db	14
		D	169	D	63	D	11
		D#/Eb	155	D#/Eb	57	D#/Eb	8
		E	145	E	52	E	5
		F	135	F	47	F	2
		F#/Gb	125	F#/Gb	42		
		G	114	G	36		
		G#/Ab	107	G#/Ab	32		
A	239	A	98	A	28		
A#/Bb	223	A#/Bb	91	A#/Bb	24		
B	208	B	83	B	21		

sound). A note's duration can be calculated by multiplying the duration value by 8.278 milliseconds. A duration of 120, for example, is about one second long.

You can enter a new sequence after the current notes have been played. Press RETURN without entering a sequence to return to the menu.

NOISE. NOISE creates unusual sound effects by randomly scrambling a sound's pitch. To hear how it works, select NOISE and enter a value 0-255; then choose PLAY. A NOISE value of 0 indicates no noise, while 255 selects the greatest amount of noise. If you enter 255, all the notes you play will sound like static. If you choose an intermediate value, you'll hear more pitch than static in the note. Experiment with different values until you get a feel for how the NOISE option affects the sound.

LOAD. This option loads sounds created by Sounding Board so you can edit them further.

SAVE. When you design a sound, you can save it to disk for later editing or use in your own programs. Two files are created when you save a sound to disk: one using the filename you entered and the other with a .S extension.

CAT. To get a catalog of the current drive, select this option.

DRIVE. When the program first runs, it defaults to using drive 1, slot 6. Using this option, you can switch between drive 1 and drive 2.

QUIT. Choose this to exit the program.

Sounding Off with BASIC

So far you've been playing sounds from inside the sound editor. Eventually, you'll want to use these sounds in your own programs. To do this, you must save your sounds to disk using the editor's SAVE option.

To access sounds from BASIC, first load the machine language sound routine VTone into memory, along with any sound files that you wish to use. The following BASIC code accomplishes just that, loading the example sound files PIANO and SQUISH:

```
10 PRINT CHR$(4);"BLOAD VTONE"
20 PRINT CHR$(4);"BLOAD PIANO,A37632"
30 PRINT CHR$(4);"BLOAD SQUISH,A37376"
```

For your own use, you should substitute for PIANO and SQUISH the filenames of the sound files that you wish to use.

You can have as many sound tables in memory as you want. Just BLOAD them in, one below the other in memory. Each sound table takes up 256 bytes of memory. Because VTone occupies memory locations 37888-38206, the first sound file—PIANO in the example above—should be loaded into memory at 37632 (37888 - 256 = 37632). After loading in all the sounds that you want, you must set HIMEM to protect VTone and the sound tables from being overwritten by BASIC.

```
40 HIMEM:37376
```

Here, HIMEM is set to 37376 because the last sound table was loaded at this location.

Before playing a sound, you should specify what noise level you want the sound to have. (This information is not included in the sound's disk file.) To set the noise level, use the command **CALL 38109,noise**. The following line sets the noise level to 0 (no noise):

```
50 CALL 38109,0
```

Before you can play a sound, you must tell VTone where the sound table is located in memory. For this, use the command **CALL 38117,address**. In line 20, we load PIANO at 37632. So, to tell VTone where PIANO is, use the following line:

```
60 CALL 38117,37632
```

To play notes using the current sound, enter the command **CALL 38083,sound parameters**. The *sound parameters* consist of a pitch-duration value for each note—just like the sound editor's play option. Except here, you must use commas to separate each item, instead of exclamation points. For example, the following line plays *do, re, mi* using a duration of 100:

```
70 CALL 38083,76,100,63,100,52,100
```

To play the same notes using the SQUISH sound and a noise level of 15, use these lines:

```
80 CALL 38109,15
```

```
90 CALL 38117,37376
```

```
100 CALL 38083,76,100,63,100,52,100
```

How It Works

You can use Sounding Board's VTone routine without knowing how it works, but you may be interested in how VTone controls the volume of the speaker. After all, Apple manuals rarely mention anything about sound volume.

When you toggle the Apple's speaker through machine language, the speaker responds by moving outward toward a maximum *out* position. When toggled again, the speaker returns to its *resting* position. If the second toggle occurs before the speaker reaches its maximum out position, the click is not as loud. Thus, volume can be controlled by carefully timing the second speaker toggle.

VTone uses data from the sound tables to figure out how much time to wait before toggling the speaker for the second time. This way, each sound can have a unique volume level for any point in time, creating a wide variety of beeps, boinks, and buzzes.

Program Key

Key	Function
I	Move envelope up
M	Move envelope down
J	Move left along envelope
K	Move right along envelope
Left Arrow	Select menu option
Right Arrow	Select menu option
Return	Activate menu option

Sounding Board—Sound Editor

Be sure to use "Apple Automatic Proofreader," found elsewhere in this issue, to enter the following program.

```
7F 100 REM COPYRIGHT 1988 COMPUTE! PUBLICA
TIONS, INC. - ALL RIGHTS RESERVED
EC 110 IF PEEK (104) < 64 THEN POKE 104,64
: POKE 16384,0: PRINT CHR$ (4)"RUN
SOUND.EDITOR"
88 120 HOME : TEXT : VTAB 10: HTAB 12: INV
ERSE : PRINT " SOUNDING BOARD ": NO
RMAL
D7 130 VTAB 12: HTAB 13: PRINT "COPYRIGHT
1988": HTAB 7: PRINT "COMPUTE! PUBL
ICATIONS, INC.": HTAB 10: PRINT "AL
L RIGHTS RESERVED"
2F 140 ONERR GOTO 1100
62 150 PRINT CHR$ (4);"BLOAD VTONE"
C9 160 HIMEM: 24576
1B 170 BL = 1:DD = 1
%6 180 DEF FN VO(I) = VL(31 * I / NU + 1)
* (1 - I * 31 / NU + INT (I * 31 /
NU)) + VL(31 * I / NU + 2) * (I * 3
1 / NU - INT (I * 31 / NU))
```



```

BA 190 PLAY = 38083: NS = 38109: TB = 38117:
SV = 5: TI = 100: MEM = 30720: IN = 1:
JX = 0: JY = 80: DIM VL(32): SC = 1.5
875: FOR W = 1 TO 32: VL(W) = 80: NE
XT W
25 200 REM POKE SHAPE TABLE AND ERROR ROUT
INE
0C 210 DATA 1,0,4,0,33,63,54,45,4,0,104,16
8,104,166,223,154,72,152,72,96
79 220 FOR W = 0 TO 19: READ I: POKE 768 +
W,I: NEXT W: POKE 232,0: POKE 233,
3: ROT= 0: SCALE= 2
E5 230 CALL TB,30720: CALL NS,0
9F 240 HGR : HCOLOR= 3: HPL0T 0,80 TO 279,
80: XDRAW 1 AT JX,JY
56 250 REM MAIN MENU
06 260 BX = 1: BY = 23: FL = 1
A0 270 HOME : VTAB 23: HTAB 2: PRINT "NEW"
;: HTAB 10: PRINT "SUST";: HTAB 18:
PRINT "TIME";: HTAB 26: PRINT "PLA
Y";: HTAB 34: PRINT "NOISE"
1D 280 HTAB 2: PRINT "LOAD";: HTAB 10: PRI
NT "SAVE";: HTAB 18: PRINT "CAT";:
HTAB 26: PRINT "DRIVE";: HTAB 34: P
RINT "QUIT";
77 290 IF ST < > 0 THEN VTAB 21: HTAB ST:
PRINT "^";
6E 300 VTAB 22: HTAB 1: PRINT "0";: HTAB 1
2: PRINT INT (TI / 40 * 12);: HTAB
24: PRINT INT (TI / 40 * 24);: HTAB
36: PRINT INT (TI / 40 * 36)
10 310 POKE - 16368,0
8B 320 HTAB BX: VTAB BY: PRINT "<";: HTAB
BX + 6: PRINT ">";
18 330 IF PEEK ( - 16384) < 128 THEN 330
5B 340 KY = PEEK ( - 16384)
18 350 POKE - 16368,0
08 360 IF KY < > 149 THEN 390
4C 370 HTAB BX: VTAB BY: PRINT " ";: HTAB
BX + 6: VTAB BY: PRINT " ";: BX = BX
+ 8: IF BX > 33 THEN BX = 1: BY = B
Y + 1: IF BY > 24 THEN BY = 23
9F 380 GOTO 320
B7 390 IF KY < > 136 THEN 430
8F 400 HTAB BX: VTAB BY: PRINT " ";: HTAB
BX + 6: VTAB BY: PRINT " ";: BX = BX
- 8: IF BX < 1 THEN :BY = BY - 1: B
X = 33: IF BY < 23 THEN BY = 24
92 410 GOTO 320
6A 420 REM CHOOSE OPTION
4C 430 IF KY = 141 THEN ON (BY - 23) * 5 +
(BX - 1) / 8 + 1 GOTO 600,630,680,
730,1060,770,860,970,1030,940
1E 440 REM CHOOSE CURSOR INCREMENT
CE 450 IF KY > 176 AND KY < 186 THEN SV =
KY - 176: GOTO 320
A8 460 REM PROCESS I,J,K,M
85 470 IF KY < > 202 THEN 500
35 480 XDRAW 1 AT JX,JY: IN = IN - 1: JX = J
X - 9: IF ( NOT IN) THEN IN = 32: JX =
279
73 490 JY = VL(IN): XDRAW 1 AT JX,JY: GOTO
320
86 500 IF KY < > 203 THEN 530
AC 510 XDRAW 1 AT JX,JY: IN = IN + 1: JX = J
X + 9: IF IN = 33 THEN IN = 1: JX =
0
1D 520 GOTO 490
A2 530 IF KY < > 205 THEN 560
E4 540 XDRAW 1 AT JX,JY: HCOLOR= 0: GOSUB
1380: VL(IN) = VL(IN) + SV: IF VL(IN)
> 159 THEN VL(IN) = 159
8E 550 FL = 1: JY = VL(IN): HCOLOR= 3: GOSU
B 1380: XDRAW 1 AT JX,JY: GOTO 320

```

```

7E 560 IF KY < > 201 THEN 320
A7 570 XDRAW 1 AT JX,JY: HCOLOR= 0: GOSUB
1380: VL(IN) = VL(IN) - SV: IF VL(IN)
< 0 THEN VL(IN) = 0
A5 580 GOTO 550
DA 590 REM NEW OPTION
7F 600 HOME : VTAB 22: INPUT "ERASE ENVELO
PE? "; A$: IF LEFT$ (A$,1) < > "Y" A
ND LEFT$ (A$,1) < > CHR$ (121) THEN
270
77 610 FOR W = 1 TO 32: VL(W) = 80: NEXT W:
JX = 0: JY = 80: IN = 1: GOTO 240
68 620 REM SUSTAIN OPTION
25 630 IF ST THEN HTAB ST: VTAB 21: PRINT
" ";
0E 640 ST = ST + 1: IF ST > 40 THEN ST = 0
A5 650 IF ST THEN HTAB ST: VTAB 21: PRINT
"^";
62 660 FL = 1: GOTO 320
80 670 REM TIME OPTION
93 680 HOME : VTAB 22: PRINT "CURRENT TIME
IS "; TI; " MILLISECONDS": INPUT "EN
TER TIME IN MILLISECONDS (40-2100)
": A$: IF A$ = "" THEN 270
5A 690 IF VAL (A$) < 40 OR VAL (A$) > 2100
THEN 680
0A 700 TI = VAL (A$): FL = 1: GOTO 270
95 710 GOTO 320
44 720 REM PLAY OPTION
A6 730 GOSUB 1300: HOME : VTAB 21
0E 740 PRINT "ENTER SEQUENCE": INPUT " "; A
$: IF A$ = "" THEN 270
EF 750 A$ = "!" + A$ + CHR$ (0): CALL 3816
3,A$: GOTO 740
A2 760 REM LOAD OPTION
31 770 TEXT : HOME : VTAB 12: INPUT "ENTER
FILE NAME (?=CATALOG, <RET> TO
CANCEL) : "; A$: PRINT
F3 780 IF A$ = "" THEN POKE - 16304,0: GOT
O 270
8A 790 IF A$ = "?" OR A$ = "/" THEN GOSUB
980: GOTO 770
5E 800 INPUT "LOADING WILL ERASE CURRENT E
NVELOPE. DO YOU WANT TO CONTINUE? "
; B$: IF LEFT$ (B$,1) = "N" OR LEFT$
(B$,1) = CHR$ ( ASC ("N") + 32) TH
EN POKE - 16304,0: GOTO 270
0C 810 PRINT CHR$ (4) "VERIFY"; A$; ".S,D"; DD
F4 820 PRINT CHR$ (4); "OPEN"; A$; ".S,D"; DD:
PRINT CHR$ (4); "READ"; A$; ".S": FOR
I = 1 TO 32: INPUT VL(I): NEXT I:
INPUT ST: INPUT TI: INPUT NI: PRINT
CHR$ (4); "CLOSE"
F8 830 HGR : HCOLOR= 3: FOR I = 0 TO 30: H
PLOT I * 9, VL(I + 1) TO I * 9 + 9, V
L(I + 2): NEXT I
5E 840 JX = 0: JY = VL(1): XDRAW 1 AT JX,JY
: FL = 1: GOTO 270
73 850 REM SAVE OPTION
67 860 TEXT : HOME
32 870 VTAB 12: INPUT "ENTER FILE NAME (?=
CATALOG, <RET> TO CANCEL) : "; A
$: PRINT
F4 880 IF A$ = "" THEN POKE - 16304,0: GOT
O 270
7B 890 IF A$ = "?" OR A$ = "/" THEN GOSUB
980: GOTO 860
CB 900 GOSUB 1300
25 910 PRINT CHR$ (4); "OPEN"; A$; ".S,D"; DD:
PRINT CHR$ (4); "WRITE"; A$; ".S": FO
R I = 1 TO 32: PRINT VL(I): NEXT I:
PRINT ST: PRINT TI: PRINT NI
27 920 PRINT CHR$ (4); "CLOSE": PRINT CHR$
(4); "BSAVE "; A$; ",A30720,L$100 ,D";

```



```

DD: POKE - 16304,0: GOTO 270
08 930 REM QUIT OPTION
6C 940 HOME : VTAB 22: INPUT "EXIT PROGRAM
? ";A$: IF LEFT$ (A$,1) < > "Y" AND
LEFT$ (A$,1) < > CHR$ (121) THEN 2
70
E0 950 TEXT : HOME : END
2C 960 REM CATALOG OPTION
B4 970 GOSUB 980: GOTO 270
6C 980 TEXT : HOME
AA 990 IF PEEK (48896) = 76 THEN PRINT CHR
$ (4)"CAT": GOTO 1010
17 1000 PRINT : PRINT CHR$ (4)"CATALOG"
0A 1010 GET A$: POKE - 16304,0: RETURN
AD 1020 REM DRIVE OPTION
11 1030 TEXT : HOME : VTAB 12: INPUT "ENTE
R DRIVE NUMBER (1 OR 2) : ";A$:DD
= VAL (A$): IF DD < > 1 AND DD < >
2 THEN 1030
C0 1040 POKE - 16304,0: GOTO 270
AF 1050 REM NOISE OPTION
0D 1060 HOME : VTAB 22: PRINT "CURRENT NOI
SE VALUE IS ";NI: INPUT "ENTER NOI
SE VALUE (0-255)";A$: IF A$ = ""
THEN 270
AA 1070 NI = VAL (A$): IF NI < 0 OR NI > 2
55 THEN 1060
FE 1080 CALL NS,NI: GOTO 270
08 1090 REM ERROR HANDLER
35 1100 IF BL THEN 1160
E2 1110 PRINT "VTONE FILE NOT ON DISK. INS
ERT CORRECT DISK AND PRESS <RET>.
PRESS <ESC> TO QUIT.": POKE -
16368,0
5C 1120 KY = PEEK ( - 16384)
08 1130 IF KY = 141 THEN POKE - 16368,0: G
OTO 150
E8 1140 IF KY = 155 THEN POKE - 16368,0: E
ND
6A 1150 GOTO 1120
0E 1160 IF PEEK (218) + PEEK (219) * 256 =
630 THEN CALL 778: GOTO 740: REM
IF ERR IN LINE 630 THEN GOTO 620
A9 1170 HOME : VTAB 12: ON PEEK (222) GOTO
1180,1180,1180,1190,1200,1210,118
0,1220,1230,1240,1250,1180,1180,11
80,1180,1260
15 1180 PRINT "ERROR #"; PEEK (222): END
B1 1190 PRINT "DISK IS WRITE PROTECTED": G
OTO 1270
78 1200 PRINT "FILE IS NOT ON DISK": PRINT
CHR$ (4);"DELETE";A$: GOTO 1270
AF 1210 PRINT "FILE IS NOT ON DISK": GOTO
1270
20 1220 PRINT "I/O ERROR": GOTO 1270
51 1230 PRINT "DISK FULL": GOTO 1270
08 1240 PRINT "FILE IS LOCKED": GOTO 1270
15 1250 PRINT "INVALID FILE NAME": GOTO 12
70
19 1260 PRINT "INVALID FILE NAME": GOTO 12
70
40 1270 INPUT "PRESS RETURN TO CONTINUE";A
$
92 1280 POKE - 16304,0: CALL 778: GOTO 270
8B 1290 REM CREATE ENVELOPE ROUTINE
5B 1300 IF NOT FL THEN RETURN
FA 1310 HOME : VTAB 21
2E 1320 PRINT "PLEASE WAIT"
46 1330 NU = INT (TI / 8.2784223) - 1: FOR
I = 0 TO NU - 1: POKE MEM + I,254
- FN VO(I) * SC: NEXT I
EC 1340 POKE MEM + I,255: POKE MEM + I + 1
,255:DR = INT (NU * ST / 40 - 1):
IF DR < 1 THEN DR = 1

```

```

33 1350 IF ST THEN POKE MEM + DR,0
D0 1360 FL = 0: RETURN
E0 1370 REM MOVE LINE SEGMENTS ROUTINE
C1 1380 IF IN > 1 THEN HPLLOT JX - 9,VL(IN
- 1) TO JX,JY
56 1390 IF IN < 32 THEN HPLLOT JX,JY TO JX
+ 9,VL(IN + 1)
D9 1400 RETURN

```

Sounding Board—VTone

For mistake-proof entry, use "Apple MLX," found elsewhere in this issue, to type in this program.

```

9400: 86 FD A9 00 85 FC 85 FA 47
9408: 85 FB A4 FB B1 07 F0 60 33
9410: C9 FF F0 5B 85 FE 85 FF 25
9418: EA 20 5F 94 A5 FA 18 69 A6
9420: 2A 85 FA A5 FB 69 00 85 84
9428: FB C5 FD F0 42 48 68 EA 7E
9430: EA EA EA EA A5 CE 0A B0 C2
9438: 04 49 1D 90 02 EA EA 85 79
9440: CE 25 09 45 06 AA A5 FA B0
9448: 18 69 01 85 FA A5 FB 69 20
9450: 00 85 FB C5 FD F0 18 85 20
9458: FF EA CA D0 E9 F0 AB A8 B5
9460: 49 FF AA CA D0 FD AD 30 3A
9468: C0 88 D0 FD AD 30 C0 60 1E
9470: E6 FB 4C 7C 94 48 68 48 3C
9478: 68 EA 85 FF A5 FE 20 5F 0A
9480: 94 A5 FC 38 E9 2A 85 FC 80
9488: A5 FD E9 00 85 FD 20 6F 15
9490: 94 85 FF F0 9D EA EA EA CD
9498: A5 CE 0A B0 04 49 1D 90 A4
94A0: 02 EA EA 85 CE 25 09 45 9D
94A8: 06 AA A5 FC 38 E9 01 85 F4
94B0: FC A5 FD E9 00 85 FD 85 B7
94B8: FF EA F0 9D 85 FF CA D0 27
94C0: E9 F0 B2 20 F5 E6 86 06 D1
94C8: 8A F0 2E 20 F5 E6 20 00 C6
94D0: 94 A6 FD F0 02 D0 25 20 7A
94D8: B7 00 D0 E7 60 20 4C E7 7A
94E0: 86 09 4C B7 00 20 BE DE 71
94E8: 20 7B DD 20 52 E7 A5 50 8C
94F0: 85 07 A5 51 85 08 4C B7 05
94F8: 00 20 F5 E6 A9 32 20 A8 56
9500: FC A9 06 20 A8 FC 20 6F BF
9508: 94 48 68 EA EA EA CA D0 B4
9510: EB F0 C4 20 BE DE 20 E3 9D
9518: DF A5 B8 8D 3E 95 A5 B9 D9
9520: 8D 3F 95 A0 01 B1 83 85 F9
9528: 88 C8 B1 83 85 B9 20 C3 67
9530: 94 AD 3E 95 85 B8 AD 3F DB
9538: 95 85 B9 4C B7 00 4C B7 99

```



On Disk Only

If you purchase this issue's *COMPUTE!'s Apple Applications Disk*, you'll find three "Sounding Board" sound files ready to load and enjoy. These sounds are saved as PIANO.S, SQUISH.S, and SPACEY.S. To use any of these files, simply load them in with the sound editor's LOAD option, or install them in your own BASIC programs following the instructions given in the article.

Look for the "On Disk Only" box in all of *Apple Applications'* articles. If a program or article can be enhanced by additional disk files, we'll explain them here and provide them on disk. For more information on ordering *COMPUTE!'s Apple Applications Disk*, see page 29.



The Photo Exchange

James R. Haynes

Exchanging Newsroom photo files with Print Shop graphics is fast and easy with this user-friendly utility. By sharing graphics, you get more out of both programs. Works on the Apple IIe, IIC, and IIGS.

The Newsroom (by Springboard Software) and *The Print Shop* (by Brøderbund) are two of the most popular commercial printing programs for Apple II-series computers. In fact, many people have found them useful complements. *The Newsroom* can easily produce double-column newsletters, while *The Print Shop* is best for designing and printing handbills, posters, and banners. Both make widespread use of graphics.

Though *The Print Shop* has its own graphics package, you may want to share graphics with your *Newsroom*-produced creations. Perhaps you want to create a handbill or poster with the same graphic (a logo, for example) that you've used in a newsletter.

That's where "The Photo Exchange" comes in. With this program, you can convert your *Newsroom* graphics files (called photos) to *Print Shop* graphics files, and vice versa. In addition, it has the added feature of being able to convert both *Print Shop* graphics and *Newsroom* photos to standard Apple graphics files that can be used by a variety of other programs—including the "Poster Maker" program found elsewhere in this issue.

Incompatible Files

The photo files created by *The Newsroom* and the graphics files used by *The Print Shop* are about as incompatible as two graphics files can get. *Newsroom*'s photo files are stored with seven-bit inverse bytes, while *Print Shop*'s graphics files are stored with eight-bit bytes.

Newsroom's photo files are of variable size (with size information stored in the file); *Print Shop*'s graphics file is a fixed size of 88 × 52 bits—relatively small when compared to the *Newsroom*'s photo files. The actual starting location of a *Newsroom* photo file picture can vary, depending on the way it is created.

Entering the Program

The Photo Exchange is compatible with either DOS 3.3 or ProDOS. However, it must be consistent with the data disks you plan to work with. Both *The Newsroom* and *The Print Shop* come on disks formatted in DOS 3.3.

This utility is written in BASIC, though most of the bit graphics manipulation is performed in machine language for speed reasons. Program 1 (EXCHANGE) loads a binary pro-

gram (EXCHANGE.ML) and performs the conversions. Program 2 is the EXCHANGE.ML file listed in MLX format.

Use "Apple Automatic Proofreader" to type in Program 1 and save it to a DOS 3.3-formatted disk. Type in Program 2 using "Apple MLX," the machine language entry program found elsewhere in this issue. When you run Apple MLX, answer its prompts as indicated:

STARTING ADDRESS? 6100
ENDING ADDRESS? 6467

You'll see an options menu; press E (for Enter). If you're just beginning to enter Program 2, specify the starting address by typing in 6100. When you've typed in all of Program 2, save it to disk by pressing S (for Save). Make sure that you use the filename EXCHANGE.ML. Otherwise, The Photo Exchange will not be able to load the file.

Line 170 of Program 1 contains the default disk drive numbers. Change the default values of DR\$ (read drive) or DW\$ (write drive) if you want to work with a drive other than drive 1.

Exchanging Files

The Photo Exchange is menu-driven and is designed to be self-explanatory. The first screen you see (Figure 1) is where you specify your *source* and *target* drives. Graphics files are converted from the source drive to the target drive. The source and target drive may be the same.

Figure 2 shows the second screen. This is where you choose which type of conversion you want: *Newsroom* to *Print Shop*, or *Print Shop* to *Newsroom*.

The third screen (Figure 3) is where you enter the *Newsroom* photo or *Print Shop* graphic filename. As shown on the screen, use the Delete key and cursor-left key, respectively, to delete the entry entirely or erase the last character. Press Escape to return to the previous screen.

Pressing Control-C displays a catalog of the disk. You can tell which filenames are *Newsroom* photo files—they have a PH. prefix. You must enter the PH. prefix when specifying a *Newsroom* file. Invalid filename characters will be ignored.

The fourth screen (Figure 4) is the graphics screen. Here you get to see your photo or graphic before it is actually converted. This screen provides several useful options. Let's see how you would use this screen to convert a *Newsroom* photo into *Print Shop* format.

The *Newsroom* photo is placed on the screen and a movable frame lets you "crop" the photo, or a portion of it, for a standard-size *Print Shop* graphic. Move the frame with the

Figure 1

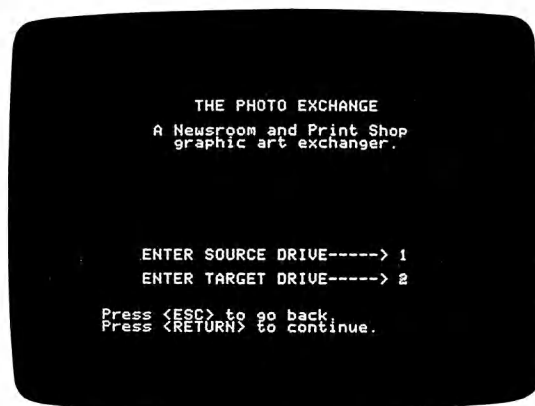
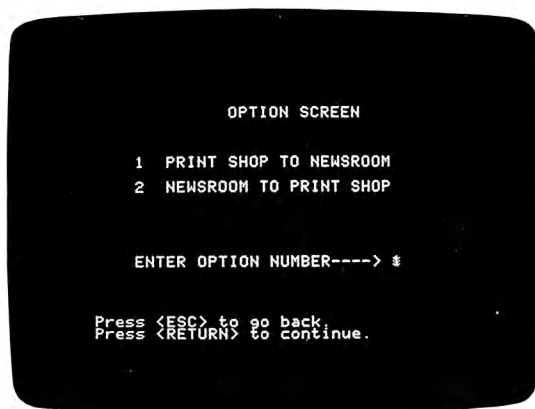


Figure 2



cursor keys until it's in the desired location. To change the size of the frame, press the single-quote key (') to toggle between double and single horizontal magnification. The frame size changes accordingly.

The double magnification maintains the same height/width proportion normally output by *Newsroom*. (The *Newsroom* program uses two horizontal pixels for each vertical pixel in its graphics, while *The Print Shop* has a one-to-one ratio.) The double magnification creates the graphic with double width so that when it's printed, it will appear proportional. The single magnification can be used to squeeze more into the graphic. Try it for some interesting effects.

Note that since *Print Shop* graphics are small compared to *Newsroom* photos, only the smaller *Newsroom* clip art figures can be completely fitted into the frame.

If you wish, you may invert the screen by pressing the backslash (\) or save the entire high-resolution screen to disk, in standard Apple format, simply by pressing the S key. When you press S, you are required to enter a filename. A file saved in standard Apple format can be used with the "Poster Maker" program found elsewhere in this issue.

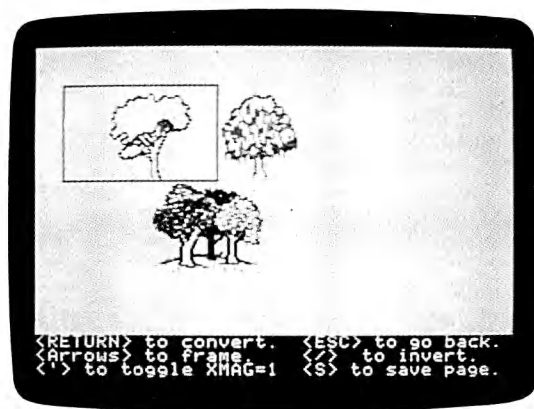
Print Shop graphics are converted in much the same way, except that the entire picture is converted; there is no need to frame an area of the screen. *Print Shop* graphics must be saved with the *Print Shop* Graphics Editor before they can be loaded by The Photo Exchange. Pressing the single-quote key stretches the graphics vertically. This vertical magnification compensates for the pixel-width difference between *Print Shop* and *Newsroom*.

As with the *Newsroom* conversion, you may press the backslash key to invert the screen, and S to save the screen in standard high-resolution format.

Figure 3



Figure 4



When everything is satisfactory, press the Return key. Type in the name you wish the file saved as (Photo Exchange automatically adds a PH. prefix), and the conversion takes place.

The Escape key returns you to the previous menu.

See the Results

Converted *Newsroom* photos can be viewed by booting the *Print Shop* disk and entering the Graphics Editor option. Select Control-G to load and examine the graphic. You can use all the normal *Print Shop* features on your own graphics disk, including a disk with files converted from *Newsroom*.

To load converted *Print Shop* files into *Newsroom*, boot your *Newsroom* disk; enter the Photo Lab; select the disk icon from the left section of the screen; and then choose the Load Photo option to load and view the photo.

The Photo Exchange

Program 1: EXCHANGE

Be sure to use "Apple Automatic Proofreader," found elsewhere in this issue, to enter the following program.

```
52 100 REM THE PHOTO EXCHANGE
93 105 REM COPYRIGHT 1988 COMPUTE! PUBLICA
      TIONS, INC. - ALL RIGHTS RESERVED
E8 107 TEXT : HOME : VTAB 6: HTAB 10: INVE
      RSE : PRINT " THE PHOTO EXCHANGE ":
      VTAB 12: HTAB 13: NORMAL : PRINT "
      COPYRIGHT 1988": HTAB 7: PRINT "COM
      PUTE! PUBLICATIONS, INC.": HTAB 10:
      PRINT "ALL RIGHTS RESERVED."
```



```

F5 110 IF PEEK (104) = 101 THEN PRINT CHR$
      (21): GOTO 140
B0 120 POKE 25856,0: POKE 104,101: POKE 10
      3,01
EC 130 PRINT CHR$ (4)"RUN EXCHANGE": PRINT
36 140 PRINT CHR$ (4)"BLOAD EXCHANGE.ML,D1
      "
9E 150 POKE 233,99: POKE 232,17: SCALE= 4:
      ROT= 0: REM FRAME SHAPE TABLE
99 160 REM DEFAULT DRIVE AND OPTION SELECT
      ION
21 170 DR$ = "1":DW$ = "1":OP$ = "1"
9F 180 ONERR GOTO 740
BD 190 REM DRIVE SELECTOR SCREEN
C8 200 TEXT : HOME : GOSUB 1310
CA 210 GOSUB 1280: HTAB 5: VTAB 15: PRINT
      "ENTER SOURCE DRIVE-----> ";Y$ = D
      R$:X = 15: GOSUB 1600:DR$ = Y$:CF$
      = Y$: GOSUB 1270
78 220 HTAB 5: VTAB 17: PRINT "ENTER TARGE
      T DRIVE-----> ";Y$ = DW$:X = 17: G
      OSUB 1600:DW$ = Y$:CF$ = Y$
04 230 REM OPTION SELECTOR SCREEN
FE 240 HOME : TEXT :Y$ = OP$: HTAB 14: VTA
      B 3: PRINT "OPTION SCREEN":A$ = "":
      A = FRE (0)
CA 250 HTAB 5: VTAB 7: PRINT "1 PRINT SHO
      P TO NEWSROOM"
F9 260 HTAB 5: VTAB 9: PRINT "2 NEWSROOM
      TO PRINT SHOP": GOSUB 1270
60 270 GOSUB 1280: HTAB 5: VTAB 15: PRINT
      "ENTER OPTION NUMBER----> ";X = 15
      : GOSUB 1600:OP$ = Y$
25 280 IF OP$ = "1" THEN A$ = "": GOTO 166
      0
17 290 REM LOAD NEWSROOM FILE SCREEN
A9 300 A$ = "PH."
32 310 HOME :CF$ = DR$: GOSUB 1320: HTAB 1
      2: VTAB 3: PRINT "READ FILE SCREEN"
90 320 FL = 1: HTAB 1: VTAB 8: PRINT "ENTE
      R NEWSROOM PHOTO FILE NAME": PRINT
      : PRINT "The PH. prefix is mandator
      y.": PRINT "Maximum 8 additional ch
      aracters.": HTAB 1: VTAB 14: PRINT
      "      $": REM 12 SPACES
6C 330 GOSUB 1300: HTAB 3: VTAB 15: PRINT
      A$;X = LEN (A$) + 3
C9 340 GOSUB 1460: IF X$ = CHR$ (3) THEN G
      OSUB 1340: GOTO 310
8F 350 IF X$ = CHR$ (27) THEN GOTO 240
0D 360 IF A$ = "" THEN 310
3F 370 REM CLEAR MEMORY & LOAD PHOTO
C7 380 NORMAL : PRINT :AR$ = A$
B2 390 POKE 25304,64: CALL 25301: REM CLEA
      R $4000-$60FF
9D 400 HOME :CF$ = DR$: GOSUB 1270: GOSUB
      1230: IF X$ = CHR$ (27) THEN 310
8A 410 IF X$ < > CHR$ (13) THEN 400
C9 420 PRINT CHR$ (4);"BLOAD";AR$;" ,D";CF$
88 430 IF PEEK (48905) < > 76 AND PEEK (43
      635) < > 64 THEN TX$ = "NOT A NEWSR
      OOM FILE": GOTO 840
FF 440 XS = 0:YS = 0: GOSUB 1110:MG = 1:IN
      = 0:F = 0
7E 450 REM FIND PHOTO PARAMETERS
69 460 W = PEEK (16389) - PEEK (16388) + 1
      : IF W < 0 THEN W = 0
3D 470 H = PEEK (16387) - PEEK (16386) + 1
      : IF H < 0 THEN H = 0
44 480 IF H > 166 THEN H = 166
55 490 WB = INT (W / 7):WR = W - 7 * WB: I
      F WR > 0 THEN WB = WB + 1
0A 500 GOSUB 1400: CALL 25329:K = PEEK (25
      )

```

```

45 510 IF PEEK (26) > = 88 THEN TX$ = "NOT
      A NEWSROOM FILE": GOTO 840
0D 520 GOSUB 930:A$ = "": REM PROJECT AND
      FRAME
43 530 REM SAVE PRINT SHOP FILE SCREEN
36 540 HOME : TEXT :FL = 2:CF$ = DW$: GOSU
      B 1320: HTAB 12: VTAB 3: PRINT "SAV
      E FILE SCREEN"
38 550 HTAB 1: VTAB 10: PRINT "ENTER A PRI
      NT SHOP FILE NAME.": GOSUB 1300: HT
      AB 3: VTAB 15: PRINT A$;X = LEN (A
      $) + 3
97 560 GOSUB 1460: HOME : IF X$ = CHR$ (3)
      THEN GOSUB 1340: GOTO 540
8A 570 IF X$ = CHR$ (27) THEN HOME : GOSUB
      1400:A$ = "PH.": GOTO 520
72 580 IF A$ = "" THEN GOTO 540
49 590 GOSUB 1270: GOSUB 1240: IF X$ = CHR
      $ (27) THEN GOTO 540
CA 600 GOSUB 1400
37 610 POKE 25304,88: CALL 25301: GOSUB 14
      00: REM CLEAR $5800-$60FF
D5 620 P = 11 * YS + XB + 22528
8F 630 POKE 253, INT (P / 256): POKE 252,(
      P / 256 - INT (P / 256)) * 256: CAL
      L 25088: PRINT
A1 640 REM STORE PS FILE ON TARGET DRIVE
EF 650 PRINT :AW$ = A$
07 660 PRINT CHR$ (4) + "BSAVE" + AW$ + " ,
      A$5800,L$240,D";CF$
F5 670 REM NR TO PS END SCREEN
51 680 TEXT : HOME : VTAB 5: HTAB 1: PRINT
      "NEWSROOM PHOTO ["AR$"]": PRINT :
      PRINT "CONVERTED TO A": PRINT : PRI
      NT "PRINT SHOP GRAPHIC ["AW$;"]":
      PRINT : PRINT "ON THE DISK IN DRIVE
      "CF$;".
63 690 VTAB 21: HTAB 1: PRINT "Press <RETU
      RN> to return to main menu.": GOSUB
      1270: VTAB 21: HTAB 39
80 700 GET X$: IF X$ = CHR$ (27) THEN GOTO
      540
73 710 IF X$ = CHR$ (13) THEN GOTO 190
97 720 GOTO 700
C4 730 REM ERROR RECOVERY
FC 740 POKE 35,24:X = PEEK (222): PRINT CH
      R$ (7)
8F 750 Y = PEEK (218) + PEEK (219) * 256
3C 760 IF FL = 1 OR FL = 3 THEN FL$ = "R"
85 770 IF FL = 2 OR FL = 4 OR FL = 5 THEN
      FL$ = "W"
0E 780 IF X = 9 THEN GOSUB 900: PRINT "DIS
      K FULL": NORMAL : GOSUB 1270: GOSUB
      1240: GOTO 850
DB 790 IF X = 8 AND FL$ = "R" THEN GOSUB 9
      00: GOSUB 1290: NORMAL : GOSUB 1270
      : GOSUB 1230: GOTO 850
D1 800 IF X = 8 AND FL$ = "W" THEN GOSUB 9
      00: GOSUB 1290: NORMAL : GOSUB 1270
      : GOSUB 1240: GOTO 850
00 810 IF X = 6 OR X = 7 THEN GOSUB 900: P
      RINT "FILE NOT FOUND": NORMAL : GOS
      UB 910: CALL 62248: GOTO 890
A6 820 IF X = 4 THEN GOSUB 900: PRINT "WRI
      TE PROTECTED": NORMAL : GOSUB 1270:
      GOSUB 1250: GOTO 850
00 830 GOSUB 900: PRINT "ERROR ";X;" IN LI
      NE ";Y: NORMAL : CALL 62248: POKE 2
      16,0: TEXT : STOP : GOTO 180
18 840 GOSUB 900: PRINT TX$;: PRINT CHR$ (
      7): NORMAL : GOSUB 910: GOTO 890
28 850 IF X$ = CHR$ (27) AND FL$ = "R" THE
      N NORMAL : CALL 62248: HOME : GOSUB
      1320:C$ = "": GOTO 890

```


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	List \$	Our \$
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	List \$	Our \$
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Wizardry IV	\$60	\$41

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	List \$	Our \$
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	List \$	Our \$
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	List \$	Our \$
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	List \$	Our \$
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	List \$	Our \$
Alt. Reality - City	\$30	\$21
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Echelon	\$45	\$31
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Full Count Bball	\$40	\$28
Gauntlet	\$40	\$28
Gudenan	\$30	\$21
Gulf Strike	\$30	\$21
High Seas	\$50	\$34
King's Quest I or II	\$50	\$34
ML Baseball	\$40	\$28
Might & Magic	\$50	\$34
NBA	\$40	\$28
Paperboy	\$40	\$28
Pirates	\$40	\$28
Silent Service	\$35	\$24
Space Quest II	\$50	\$34
Star Fleet I	\$50	\$34
Strategic Conq	\$50	\$34
Thunder Chopper	\$30	\$21
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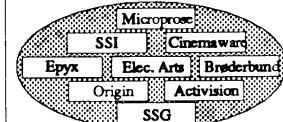
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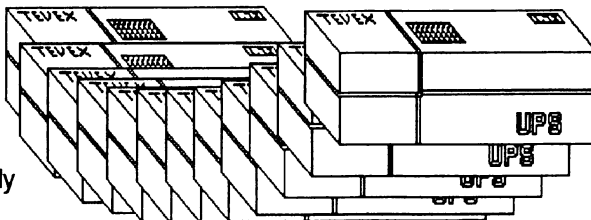
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```

2F 860 IF X$ = CHR$ (27) AND FL$ = "W" THE
    N NORMAL : CALL 62248: HOME : GOSUB
    1320:C$ = "": GOTO 890
1C 870 IF C$ = "C" THEN NORMAL : HOME : GO
    SUB 1280: POKE 35,19: HOME
19 880 NORMAL : RESUME
8D 890 ON FL GOTO 310,540,1660,1900,2090:
    STOP
DD 900 HOME : INVERSE : HTAB 5: VTAB 5: RE
    TURN
C3 910 FOR I = 1 TO 1000: NEXT I: RETURN
EC 920 REM FRAMING SCREEN SUBROUTINE
55 930 GOSUB 1170: GOSUB 1210
AD 940 HGR : HCOLOR= 3 * (IN = 0): HPL0T 0
    ,0: CALL - 3082:WR = 0: CALL 24832
2F 950 GOSUB 1110: GOSUB 1440: GOSUB 1400
A6 960 GET X$: POKE 49200,0
4A 970 IF X$ = CHR$ (13) THEN TEXT : HOME
    : GOSUB 1400: GOSUB 1440: RETURN
47 980 IF X$ = CHR$ (27) THEN POP : TEXT :
    HOME : GOSUB 1320: GOTO 320
CE 990 IF X$ = CHR$ (32) THEN POKE 49235 -
    (F = 0),0:F = (F = 0): GOTO 960
0C 1000 IF X$ = CHR$ (39) THEN GOSUB 1440:
    MG = 1 + (MG = 1): HTAB 20: VTAB 2
    3: PRINT MG;: VTAB 1: GOTO 950
8D 1010 IF X$ = CHR$ (47) THEN IN = (IN =
    0) * 255: GOSUB 1440: GOSUB 1400:
    GOTO 940
FD 1020 IC = 1 + 9 * ( PEEK (49249) > 127)
    + 4 * ( PEEK (49250) > 127)
4A 1030 IF X$ = CHR$ (11) THEN YT = YT + I
    C: GOTO 1090
05 1040 IF X$ = CHR$ (10) THEN YT = YT - I
    C: GOTO 1090
79 1050 IF X$ = CHR$ (21) THEN XT = XT - I
    C: GOTO 1090
78 1060 IF X$ = CHR$ (08) THEN XT = XT + I
    C: GOTO 1090
4B 1070 IF X$ = CHR$ (83) OR X$ = CHR$ (11
    5) THEN GOSUB 1440: GOSUB 2080: GO
    TO 930
FB 1080 GOTO 960
96 1090 GOSUB 1440:X$ = XT:Y$ = YT: GOSUB
    1110: GOTO 950
80 1100 REM FRAME LIMITS
ED 1110 IF X$ < - 149 - 44 * (MG = 2) THEN
    X$ = - 149 - 44 * (MG = 2)
81 1120 IF X$ > 42 THEN X$ = 42
82 1130 IF Y$ > 24 THEN Y$ = 24
02 1140 IF Y$ < - 115 THEN Y$ = - 115
9D 1150 XT = X$:YT = Y$: RETURN
D6 1160 REM PROJECTION MENU TEXT
E9 1170 HOME : HTAB 1: VTAB 21: PRINT "<RE
    TURN> to convert. <ESC> to go bac
    k."
80 1180 PRINT " </>
    to invert.": REM 22 SPACES
7E 1190 PRINT "<'> to toggle YMAG="; STR$
    (MG);" <S> to save page.";
27 1200 HTAB 1:-VTAB 1: RETURN
7E 1210 HTAB 1: VTAB 22: PRINT "<Arrows> t
    o frame.": HTAB 15: VTAB 23: PRIN
    T "X";: HTAB 1: VTAB 1: RETURN
A6 1220 REM DISK PROMPT ROUTINES
09 1230 HTAB 1: VTAB 15: PRINT "PUT SOURCE
    DISK IN DRIVE ";DR$;: GOSUB 1280:
    HTAB 30: VTAB 21: GET X$: PRINT :
    RETURN
58 1240 HTAB 1: VTAB 15: PRINT "PUT TARGET
    DISK IN DRIVE ";DW$;: GOSUB 1280:
    HTAB 30: VTAB 21: GET X$: PRINT :
    RETURN
53 1250 HTAB 1: VTAB 15: PRINT "REMOVE TAB
    IN DRIVE ";DW$;" AND ": PRINT "PR
    ESS <RETURN> TO CONTINUE.": GET X
    $: PRINT : RETURN
EA 1260 REM MISC. TEXT STATEMENTS
8C 1270 HTAB 1: VTAB 20: PRINT "Press <ESC
    > to go back.": RETURN
DF 1280 HTAB 1: VTAB 21: PRINT "Press <RET
    URN> to continue.": RETURN
C9 1290 PRINT "I/O ERROR IN DRIVE ";CF$;:
    RETURN
1B 1300 HTAB 3: VTAB 15: INVERSE : PRINT "
    ": RETURN : REM 15
    SPACES
17 1310 HTAB 10: VTAB 3: PRINT "THE PHOTO
    EXCHANGE": HTAB 6: VTAB 5: PRINT "
    A Newsroom and Print Shop": HTAB 8
    : VTAB 6: PRINT "graphic art excha
    nger.": RETURN
30 1320 HTAB 1: VTAB 17: PRINT "<DELETE>
    to delete entry. ": PRINT "<C
    ont-H> or <- to backspace. ": PRIN
    T "<ESC> to go back.": PR
    INT "<Cont-C> to catalog dri
    ve ";CF$;".": PRINT "<RETURN>
    to continue.": RETURN
77 1330 REM CATALOG
20 1340 C$ = "C": POKE 44452,18: POKE 4460
    5,17
78 1350 HOME : GOSUB 1280: POKE 35,19: HOM
    E : IF PEEK (48905) < > 76 THEN PR
    INT CHR$ (4)"CATALOG,D";CF$; GOTO
    1360
FB 1355 PRINT CHR$ (4)"CAT ,D";CF$
94 1360 GET X$: IF X$ = CHR$ (13) THEN HOM
    E : GOTO 1380
8A 1370 GOTO 1360
85 1380 POKE 35,24:C$ = "": RETURN
8E 1390 REM SET & RESET BINARY DATA
A9 1400 XB = INT (XS * MG / 8):XR = (XS *
    MG / 8 - XB) * 8
02 1410 LS = 0: IF XB < 0 THEN LS = 256 +
    XB:XB = 0
88 1420 POKE 06,WB: POKE 239,IN: POKE 227,
    MG - 1: POKE 09,WR: POKE 26,64: PO
    KE 30,H - 1: POKE 08,XR: POKE 25,K
    : POKE 238,10 - XB: POKE 250,LS: R
    ETURN
F0 1430 REM XDRAW FRAMES
EA 1440 XDRAW MG AT 42 - XS,24 - YS: RETUR
    N
A6 1450 REM FILE NAME EDITOR
AC 1460 HTAB X: VTAB 15: GET X$: IF X$ = C
    HR$ (3) THEN 1580
2C 1470 IF X$ = CHR$ (8) AND LEN (A$) > 1
    THEN PRINT " ":X = X - 1:A$ = LEFT
    $ (A$, LEN (A$) - 1): HTAB X: VTAB
    15: PRINT " ": GOTO 1460
22 1480 IF X$ = CHR$ (8) AND ( LEN (A$) =
    1 OR LEN (A$) = 0) THEN A$ = "":X
    = 3: HTAB 3: VTAB 15: PRINT " ":
    GOTO 1460
1F 1490 IF X$ = CHR$ (27) OR X$ = CHR$ (13
    ) THEN GOTO 1580
0F 1500 IF X$ = CHR$ (127) THEN A$ = "":X
    = 3: GOSUB 1300: GOTO 1460
81 1510 IF X$ > CHR$ (96) THEN X$ = CHR$ (
    ASC (X$) - 32)
55 1520 IF X$ < CHR$ (46) OR X$ = CHR$ (47
    ) GOTO 1460
1C 1530 IF X$ < CHR$ (65) AND X$ > CHR$ (5
    7) THEN GOTO 1460
20 1540 IF X = 3 AND (X$ < CHR$ (65) OR X$
    > CHR$ (90)) THEN GOTO 1460
99 1550 IF X$ < CHR$ (97) AND X$ > CHR$ (9

```



```

      0) THEN 1460
6D 1560 A$ = A$ + X$:X = X + 1: PRINT X$;:
      IF X < 18 THEN 1460
EC 1570 A$ = LEFT$(A$,15):X = X - 1: GOTO
      1460
89 1580 NORMAL : RETURN
99 1590 REM DRIVE AND OPTION SELECTOR SUBR
      OUTINE
F1 1600 VTAB X: HTAB 30: PRINT Y$;: VTAB X
      : HTAB 30: GET X$: IF X$ = CHR$ (1
      3) THEN 1640
88 1610 IF X$ = "1" OR X$ = "2" THEN Y$ =
      X$: GOTO 1600
64 1620 IF X$ = CHR$ (27) THEN POP : GOTO
      200
6E 1630 GOTO 1600
ED 1640 RETURN
9E 1650 REM LOAD PRINT SHOP FILE SCREEN
D6 1660 HOME : TEXT :CF$ = DR$: GOSUB 1320
      : HTAB 12: VTAB 3: PRINT "LOAD FIL
      E SCREEN"
E7 1670 FL = 3: HTAB 1: VTAB 8: PRINT "ENT
      ER PRINT SHOP FILE NAME ": PRI
      NT : GOSUB 1300: HTAB 3: VTAB 15:
      PRINT A$;:X = LEN (A$) + 3
85 1680 GOSUB 1460: IF X$ = CHR$ (3) THEN
      GOSUB 1340: GOTO 1660
4E 1690 IF X$ = CHR$ (27) THEN A$ = "": GO
      TO 240
8E 1700 IF A$ = "" THEN 1660
2D 1710 NORMAL : PRINT :AR$ = A$
64 1720 HOME :CF$ = DR$: GOSUB 1270: GOSUB
      1230: IF X$ = CHR$ (27) THEN 1660
FA 1730 IF X$ < > CHR$ (13) THEN 1720
26 1740 PRINT CHR$ (4);"BLOOD";AR$;"D";CF
      $: PRINT : IF PEEK (48905) < > 76
      AND PEEK (43635) < > 88 THEN TX$ =
      "NOT A PRINT SHOP FILE": GOTO 840
21 1750 REM PROJECTION SCREEN
A9 1760 MG = 1:IN = 0: GOSUB 1170
89 1770 POKE 227,MG - 1: POKE 239,0: CALL
      25462:WB = 13:WR = 4:XS = 0:YS = 0
8F 1780 H = 52 * MG:W = 88
ED 1790 GOSUB 1400: CALL 25329:K = PEEK (2
      5)
40 1800 HGR : HCOLOR= 3 * (IN = 0): HPL0T
      0,0: CALL - 3082:WR = 0
86 1810 CALL 24832: GOSUB 1400: REM PROJEC
      T GRAPHIC
EC 1820 GET X$: POKE 49200,0
68 1830 IF X$ = CHR$ (27) GOTO 1660
5B 1840 IF X$ = CHR$ (47) THEN IN = 127 *
      (IN = 0): GOTO 1770
16 1850 IF X$ = CHR$ (39) THEN MG = (MG =
      1) + 1: HTAB 20: VTAB 23: PRINT MG
      ;: VTAB 1: GOTO 1770
5A 1860 IF X$ = CHR$ (13) THEN A$ = "PH.":
      GOTO 1900
CC 1870 IF X$ = CHR$ (83) OR X$ = CHR$ (11
      5) THEN GOSUB 2080: GOTO 190
92 1880 GOTO 1820
8F 1890 REM SAVE NEWSROOM FILE SCREEN
54 1900 HOME : TEXT :FL = 4:CF$ = DW$: GOS
      UB 1320: HTAB 12: VTAB 3: PRINT "S
      AVE FILE SCREEN": HTAB 1: VTAB 10:
      PRINT "ENTER NEWSROOM FILE NAME"
74 1910 HTAB 1: VTAB 8: PRINT "ENTER NEWSR
      OOM PHOTO FILE NAME": PRINT : PRIN
      T "The PH. prefix is mandatory.":
      PRINT "Maximum 8 additional charac
      ters.": HTAB 1: VTAB 14: PRINT "
      *": REM 12 SPACES
92 1920 GOSUB 1300: HTAB 3: VTAB 15: PRINT
      A$;:X = LEN (A$) + 3

```

```

F3 1930 GOSUB 1460: HOME : IF X$ = CHR$ (3
      ) THEN GOSUB 1340: GOTO 1900
A2 1940 IF X$ = CHR$ (27) THEN HOME :A$ =
      "": GOSUB 1170: GOSUB 1400: GOTO 1
      770
EE 1950 IF A$ = "" THEN GOTO 1900
91 1960 GOSUB 1270: GOSUB 1240: IF X$ = CH
      R$ (27) THEN GOTO 1900
F6 1970 POKE 227,MG - 1: POKE 239,IN: CALL
      25462: REM FINAL CONVERSION
95 1980 REM STORE NEWSROOM FILE ON TARGET
      DRIVE
90 1990 PRINT :AW$ = A$:L$ = "L" + STR$ (M
      G * 688)
55 2000 PRINT CHR$ (4) + "BSAVE" + AW$ + "
      ,A$4000," + L$ + ",D";CF$
5C 2010 REM PS TO NR END SCREEN
88 2020 TEXT : HOME : VTAB 5: HTAB 1: PRIN
      T "PRINT SHOP FILE ["AR$"]": PRINT
      : PRINT "CONVERTED TO A": PRINT :
      PRINT "NEWSROOM PHOTO ["AW$;"]":
      PRINT : PRINT "ON THE DISK IN DRI
      VE ";CF$;". "
2D 2030 VTAB 21: HTAB 1: PRINT "Press <RET
      URN> to return to menu. ": PRINT "
      Press <ESC> to go back.": VTAB 21:
      HTAB 39
7B 2040 GET X$: IF X$ = CHR$ (27) THEN GOT
      O 1900
9B 2050 IF X$ = CHR$ (13) THEN GOTO 190
74 2060 GOTO 2040
FA 2070 REM SAVE COMPLETE GRAPHICS PAGE 1
EC 2080 TX$ = A$:A$ = ""
33 2090 HOME : TEXT :FL = 4:CF$ = DW$: GOS
      UB 1320: HTAB 12: VTAB 3: PRINT "S
      AVE PAGE SCREEN": HTAB 1: VTAB 10:
      PRINT "ENTER A NAME FOR THE GRAPH
      IC PAGE"
9A 2100 HTAB 1: VTAB 12: PRINT "This file
      requires 8192 bytes.": GOSUB 1300:
      HTAB 3: VTAB 15: PRINT A$;:X = LE
      N (A$) + 3
03 2110 GOSUB 1460: HOME : IF X$ = CHR$ (3
      ) THEN GOSUB 1340: GOTO 2090
E7 2120 IF X$ = CHR$ (27) THEN HOME : GOSU
      B 1400: GOTO 2170
70 2130 IF A$ = "" THEN GOTO 2090
FC 2140 GOSUB 1270: GOSUB 1240: IF X$ = CH
      R$ (27) THEN GOTO 2090
88 2150 PRINT :AW$ = A$
F4 2160 PRINT CHR$ (4) + "BSAVE" + AW$ + "
      ,A$2000,L$2000,D";CF$
BA 2170 PRINT :A$ = TX$: RETURN

```

Program 2: EXCHANGE.ML

For mistake-proof entry, use "Apple MLX," found elsewhere in this issue, to type in this program.

```

6100: A2 03 86 EB A2 00 86 EC 73
6108: 86 ED 86 DF 86 FE A9 40 1C
6110: 85 1A A9 21 85 FB A9 86 59
6118: 85 FA C6 06 A6 ED E4 06 52
6120: D0 2A A0 00 B1 19 85 1D 04
6128: 45 09 29 7F 91 19 20 B5 D3
6130: 61 A6 FE E4 1E D0 01 60 12
6138: E6 FE 38 A5 FA E5 ED 85 60
6140: FA B0 02 C6 FB A2 00 86 4A
6148: ED 4C 52 61 20 B5 61 4C 5C
6150: 1C 61 A5 FB A6 EC E0 07 9F
6158: D0 12 A2 00 86 EC A9 1C B3
6160: 85 FD A9 00 85 FC 20 D8 D3
6168: 61 4C 76 61 18 69 04 85 C7
6170: FB E6 EC 4C 1C 61 A5 FA F9

```

6178: A6 EB E0 07 D0 12 A2 00 2A
 6180: 86 EB A9 03 85 FD A9 80 DE
 6188: 85 FC 20 D8 61 4C 9E 61 B9
 6190: 18 69 80 85 FA 90 02 E6 27
 6198: FB E6 EB 4C 1C 61 A5 FA 02
 61A0: A6 DF E0 02 D0 01 60 18 4E
 61A8: 69 28 85 FA 90 02 E6 FB E0
 61B0: E6 DF 4C 1C 61 A0 00 B1 69
 61B8: 19 45 EF 29 7F 91 FA 18 3A
 61C0: A5 FA 69 01 85 FA 90 02 8D
 61C8: E6 FB E6 ED 18 A5 19 69 AC
 61D0: 01 85 19 90 02 E6 1A 60 E1
 61D8: 38 A5 FA E5 FC 85 FA B0 83
 61E0: 02 C6 FB 38 A5 FB E5 FD 40
 61E8: 85 FB 60 A2 00 A9 FF 18 62
 61F0: 2A E8 E4 09 D0 F9 85 09 B2
 61F8: 60 4A 48 41 59 4E 45 53 7D
 6200: A5 FC 85 1B A5 FD 85 1C 85
 6208: A5 FA 85 EB A9 00 85 DF 06
 6210: 85 1D A5 06 85 07 38 A9 56
 6218: 08 E5 08 AA A0 00 B1 19 87
 6220: 49 FF A0 08 88 C0 00 F0 56
 6228: 05 6A 48 4C 3C 62 C6 07 D7
 6230: A5 07 C9 00 F0 32 20 CC 20
 6238: 61 4C 1C 62 A9 18 90 02 3B
 6240: A9 38 8D 58 62 A5 1D 2A 2D
 6248: 85 1D CA E0 00 D0 03 20 E7
 6250: 95 62 A5 E3 F0 0E A5 1D 93
 6258: 18 2A 85 1D CA E0 00 D0 E0
 6260: 03 20 95 62 68 4C 24 62 A6
 6268: A5 1D 18 2A 85 1D CA E0 04
 6270: 00 F0 03 4C 68 62 A5 1D CB
 6278: 20 B3 62 20 CC 61 18 A5 4A
 6280: FC 69 0B 85 FC 90 02 E6 EC

6288: FD A5 1E C9 00 F0 05 C6 AA
 6290: 1E 4C 00 62 60 A2 08 A5 E0
 6298: EB 30 15 A2 08 A5 1D 20 5D
 62A0: B3 62 A9 00 85 1D E6 1B 96
 62A8: A5 1B C9 00 D0 02 E6 1C B8
 62B0: E6 EB 60 84 ED A0 61 38 25
 62B8: C4 1C 30 14 A0 57 38 C4 C5
 62C0: 1C B0 0D A4 EE 38 C4 DF 6D
 62C8: 30 06 45 EF A0 00 91 1B 12
 62D0: A4 ED E6 DF 60 A0 00 A9 6D
 62D8: 58 85 1C A9 00 85 1B A5 3B
 62E0: EF 91 1B 20 2D 64 EA A5 DD
 62E8: 1C C9 61 F0 03 4C DF 62 D4
 62F0: 60 A9 00 85 19 A9 40 85 1E
 62F8: 1A A0 00 B1 19 C9 FF F0 EE
 6300: 09 20 CC 61 A5 1A C9 58 84
 6308: D0 F1 20 CC 61 20 EB 61 49
 6310: 60 02 00 06 00 2A 00 2D BD
 6318: 2D 2D 2D 2D 2D 2D 2D DE
 6320: 2D 2D 36 36 36 36 36 20
 6328: 3E 3F 3F 3F 3F 3F 3F 6E
 6330: 3F 3F 3F 27 24 24 24 DE
 6338: 24 24 00 2D 2D 2D 2D 92
 6340: 35 36 36 36 36 36 36 8F
 6348: 3F 3F 3F 3F 27 24 24 90
 6350: 24 24 24 00 2D 36 36 9B
 6358: 36 36 36 3E 3F 3F 3F 27
 6360: 3F 3F 3F 3F 3F 3F 27 DB
 6368: 24 24 24 24 24 00 A4 02 7D
 6370: 30 63 50 A7 00 FF A0 07 F4
 6378: A9 6E 85 1B A9 63 85 1C 14
 6380: A9 40 85 FD A9 00 85 FC 12
 6388: 85 19 B1 1B 91 FC 88 10 E1
 6390: F9 A9 08 85 FC A9 58 85 DC
 6398: 1A A9 33 85 1E A9 08 85 C8
 63A0: 06 A5 E3 F0 03 20 54 64 05
 63A8: A5 FC 85 1B A5 FD 85 1C 30
 63B0: A9 00 85 1D A5 06 85 07 26
 63B8: A2 07 A0 00 B1 19 49 FF 2B
 63C0: A0 09 88 C0 00 F0 05 2A 2F
 63C8: 48 4C DA 63 C6 07 A5 07 FC
 63D0: C9 00 F0 17 20 CC 61 4C 4F
 63D8: BA 63 A5 1D 6A 85 1D CA CA
 63E0: E0 00 D0 03 20 22 64 68 1D
 63E8: 4C C2 63 A5 1D 4A 4A 4A 3E
 63F0: 48 A5 EF D0 06 68 29 1F 93
 63F8: 18 90 03 68 09 E0 20 38 1B
 6400: 64 20 CC 61 A9 0D A6 E3 65
 6408: E0 00 F0 01 0A 18 65 FC E7
 6410: 85 FC 90 02 E6 FD A5 1E A5
 6418: C9 00 F0 05 C6 1E 4C A8 24
 6420: 63 60 A2 07 A5 1D 20 38 91
 6428: 64 A9 00 85 1D E6 1B A5 46
 6430: 1B C9 00 D0 02 E6 1C 60 4A
 6438: 84 ED 6A 45 EF 29 7F A0 24
 6440: 00 91 1B 48 A5 E3 F0 08 FB
 6448: 68 A0 0D 91 1B A4 ED 60 CF
 6450: 68 A4 ED 60 18 AD 02 40 F5
 6458: 69 67 8D 03 40 0E 00 40 0C
 6460: 0E 01 40 EE 01 40 60 24 55

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Gradebook

William Chin, Assistant Technical Editor

This computerized gradebook is a valuable organizational tool. Teachers can use it to store grades for as many as 50 students with 30 grades each. It also alphabetizes names, sorts grades, and calculates averages and grade distributions. Although designed for the classroom, "Gradebook" can, in addition, record golf rounds or bowling scores. For the Apple IIc, IIGS, and Apple IIe with 80-column card.

Schools continue to buy computers for students. But teachers need the timesaving convenience offered by computers as much as anyone. "Gradebook," designed especially for teachers, is a utility that efficiently handles classroom record keeping, replaces the periodic drudgery of averaging grades, and is easy to use.

Originally written for the Atari 800, Gradebook handles grades for 30 assignments, with as many as 50 students in a single file. It also calculates averages and weighted averages, sorts scores, alphabetizes names, and shows grade distributions and summaries.

The First Page

Gradebook is written entirely in Applesoft BASIC, so use the "Apple Automatic Proofreader," found elsewhere in this issue, to minimize typing errors as you enter the program. Be sure to save a copy of Gradebook to disk. To use, simply load the program and enter RUN.

Gradebook's screen looks like a big spreadsheet. The assignment numbers are displayed near the top of the screen, one per column. The students' names are listed in the very first column.

The cursor appears as an inverse area at the top left corner of the first name field. Use the arrow keys to move to the different columns. If you move the cursor to the far right column and press the right-arrow key, all columns scroll to the left to make room for the next few columns. When you move downward off the screen, the screen display scrolls upward to make room for the next few rows. The screen scrolls by ten rows or columns until you reach the limits of the spreadsheet (50 students \times 30 grades).

From now on, when talking about the intersection of a row and column, we'll refer to it as a *field*. A field is simply the screen location where you enter a student's name or grade.

Entering Names and Grades

To enter names, move to a name field, type in the name, and press Return. Spaces are permitted in names, but when you press the space bar while in a grade field, you move right, just

as you would if you pressed the right-arrow key. Both the Delete key and the left-arrow key remove the last character in a name.

Don't worry about alphabetizing the names, because the program will do that for you (see below). If you plan to alphabetize the names, you should enter the names in *Lastname, Firstname* format. Do not skip lines between students. Blank name fields found in the middle of your data may cause problems. Use Control-D to delete a row if a student leaves your class.

Use the right cursor key to move from the name column to the first assignment column. The Return key works like the down-arrow key and the Escape key clears the current field.

Entering grades is easy. Move the cursor to the desired row and column and type in the grade. If you type in more than three digits, the number scrolls to the left. So typing in the digits 19357 puts 357 into that field. Letters and decimal points are not permitted in grade fields.

For each assignment, you can specify a perfect score. The perfect score appears at the top of the screen, one for each assignment. Gradebook allows grades to be higher than the perfect score to accommodate extra credit or extraordinary work. When you enter grades higher than the perfect score, however, a warning message appears. Besides erasing students from the Gradebook spreadsheet, Control-D can also delete a column to discard the results of a particular assignment.

There will be times when you'll want to move through your Gradebook data faster than the arrow keys permit. To move through the spreadsheet a screen at a time, instead of field by field, press the Open Apple key in conjunction with one of the arrow keys. Other useful commands are Control-T, to move to the top of the screen; Control-B, to move to the bottom of the screen; and Control-F, to return to the top left corner of the entire Gradebook spreadsheet.

Gradebook includes a powerful sort function. To alphabetize names, move the cursor to the name column and press Control-O. When the cursor is in a grade column, Control-O sorts the students by their grade for that assignment. The students with the highest scores are listed first. It takes approximately one minute to sort 50 students and their grades.

Once you've entered your students' names and grades, press Control-S to save the grades to disk. Control-L loads a file from disk. Gradebook automatically tags a GRD extension to the filename that you enter. You do not have to enter this extension when loading files. To get a disk directory, enter a question mark (?) at the filename prompt and press Return.

Reports

Gradebook provides a useful report generator. Activated by Control-R, Gradebook sends reports to the screen or to a printer when you press S or P, respectively. The next prompt

Assignment #3 grade summary

Grade distribution

```
100 +      xxx
90 to 99   xxxxxxxxxxxxxxxxxxxxxxxx
80 to 89   xxxxxxxx
70 to 79   xxx
60 to 69   x
50 to 59
40 to 49   x
30 to 39   xxx
20 to 29   xxxxxxx
10 to 19
0 to 9     x
```

Perfect score is 100, % of total grade is 0

Average score is 79

Best score is 293 by: Roosevelt, Theodore

In this assignment report, most of the scores range between 90–99. With a whopping 293 points, Theodore Roosevelt received the highest score.

asks you to choose row (student) reports or column (assignment) reports.

To see all the grades for a particular student, as well as his or her average score, press R. The average provided is a straight average, calculated by taking the sum of all the grades and dividing by the number of assignments. Note that this average and the one given by the Control-A function (described below) are calculated differently.

Pressing C generates a report on the current column's assignment. This includes the grade distribution, the average score, and the best score for that particular assignment. The grade distribution is a horizontal bar graph with X's representing each student. There are 11 intervals in the graph, ten percentage points apart. So if the perfect mark for an assignment is 100, the lines of the bar graph are 100+, followed by 90–99, 80–89, and so on, ending up with 0–9. For a perfect score of 800, the graph includes lines for 800+, 700–799, 600–699, and so on.

The assignment report ends with the name and score of the student with the highest grade. In case of a tie, everyone with the highest grade is listed. (See the sample assignment-report printout.)

For a simple printout, press Control-P. With this command you can get all the grades for a particular assignment, all the grades for a single student, or a printout of all the students and their grades. This option does not calculate averages and only includes data for the 15 assignments shown on the screen.

Both Control-Q and Control-E exit the program and return to BASIC. The ? key displays Gradebook's command summary.

A Perfect Score

On the SAT, a score of 800 is perfect; in figure skating, 6 is a perfect mark; in bowling, 300 is the best possible score. Gradebook gives you the option of selecting perfect scores to match the assignments. Some teachers like to give assignments or quizzes with 10 as a perfect score. You can also base the perfect score on the actual number of questions in each test.

At the top of each column is a place to enter the perfect score and the percentage (weight) of the grade. When you run the program, all of the perfect scores are set to 100 and all of the percentages are set to 0.

The program uses the perfect score value for each

assignment to calculate a percentage grade. This feature offers an added convenience: You don't have to figure all grades on a 100-percent base. You can enter a grade based, say, on the actual number of correct answers.

Percentage of grade allows you to give different weights to various tests—finals, midterms, and so on. For example, suppose you give seven tests during a quarter. Two of the seven are unit tests, which count more heavily than the other five. All you need to do is assign a higher percentage for the unit tests. Note, however, that the total of all the percentages of grades must equal 100. In our example, we might have the two unit tests each count as 25 percent of the total and the other five tests each count as 10 percent (25, 25, 10, 10, 10, 10, 10, for a 100-percent total).

Once the perfect scores and percentages are entered, press Control-A to calculate grade averages. You'll get two types of calculations. AVG is the unweighted average (all marks are added together and divided by all the perfect scores added together). WAV is the weighted average, which is calculated with this formula:

$$\text{mark\#1} * \text{weight\#1} / \text{perfect mark\#1} +$$

$$\text{mark\#2} * \text{weight\#2} / \text{perfect mark\#2} +$$

$$\text{mark\#3} * \text{weight\#3} / \text{perfect mark\#3} +$$

$$\text{mark\#4} * \text{weight\#4} / \text{perfect mark\#4}$$

... and so on for all the grades.

If the total of all the numbers in the second row is not 100, weighted averages cannot be calculated.

The averages display shows averages for the first 15 students listed in the Gradebook spreadsheet. To see the averages for the next 15 students, use the down-arrow key. To move upward through the list, press the up arrow.

Program Key

Key	Function
Control-A	Calculate averages
Control-B	Move to bottom of screen
Control-D	Delete row or column
Control-E	Exit program
Control-F	Move to top of file
Control-L	Load file
Control-N	Exit averages display
Control-O	Sort data
Control-P	Print data
Control-Q	Exit program
Control-R	Generate report
Control-S	Save file
Control-T	Move to top of screen
?	List commands
Arrow keys	Move through spreadsheet
Open Apple- arrow keys	Page through data
Return	Move down
Space	Move right when in grade field
Escape	Clear field

There are three additional options available from within the averages display: Control-O lets you sort the students by name, average score, or weighted average; Control-P prints the screen; Control-R generates grade reports (see above); and Control-N returns you to the normal spreadsheet screen. When you sort via Control-O, you not only sort the data shown on the averages display; you sort all the data displayed in the Gradebook spreadsheet.

Customizing

Gradebook is set up for 50 students with 30 grades each. You can change line 110 to accommodate larger classes with fewer assignments or smaller classes with more grades. For example, set NS to equal 61 and NG to equal 25 for 60 students with 25 assignments (NS must be set equal to the number of students plus 1). Large increases in either number may result in an OUT OF MEMORY? error. Do not make either number smaller than 16.

Instead of using the program only for student names and grades, you can use Gradebook to keep track of any type of name and/or number. Other uses for Gradebook include recording game scores for your bowling team or tracking golf scores. The average, report, and sort functions can provide interesting insights.

Gradebook

Be sure to use "Apple Automatic Proofreader," found elsewhere in this issue, to enter the following program.

```

9F 100 REM Copyright 1988 COMPUTE! Publications, Inc. All rights reserved.
29 110 NS = 51:NG = 30: DIM N$(NS),G(NS + 2,NG + 2),A(NS * 2),B(NS * 2),C(127),DX(3),DY(3),N2$(NS),G%(NS,NG + 2):D$ = CHR$(4):M$ = CHR$(124):Z$ = M$:NULL$ = CHR$(123)
BB 120 FOR I = 0 TO 127:C(I) = - 1: NEXT I: PRINT : PRINT D$"PR#3"
AA 130 C(10) = 4:C(11) = 5:C(8) = 6:C(21) = 7:C(13) = 4:C(32) = 8
CS 140 FOR I = 65 TO 90:C(I) = 1:C(I + 32) = 1: NEXT I: FOR I = 48 TO 57:C(I) = 2: NEXT
BF 150 FOR I = 44 TO 47:C(I) = 1: NEXT I:C(34) = 1:C(39) = 1:C(127) = 3
46 160 DY(0) = 1:DY(1) = - 1:DX(2) = - 1:DX(3) = 1
AA 170 C(27) = 9:C(5) = 10:C(17) = 10:C(16) = 11:C(4) = 12:C(19) = 13:C(12) = 14:C(63) = 15:C(15) = 16:C(1) = 17:C(18) = 18:C(14) = 19:C(6) = 20
66 180 C(20) = 21:C(2) = 22
2D 190 ROW = 0:COL = 0:BX = 0:BY = 2:TX = 1:TY = 7:MS = 19:RX = 0:RY = 2
BB 200 A2$ = Z$ + " ": FOR I = 1 TO 15:W$ = W$ + A2$: NEXT
DA 210 B8$ = " ":W1$ = "-": FOR I = 1 TO 7:B8$ = B8$ + B8$:W1$ = W1$ + W1$:NEXT :W1$ = LEFT$(W1$,79):BL$ = LEFT$(B8$,19):B8$ = LEFT$(B8$,79)
AF 220 R$ = Z$ + CHR$(32) + CHR$(32) + "0": FOR I = 1 TO 15:NB$ = NB$ + R$:NEXT :NB$ = LEFT$(BL$,19) + NB$
BB 230 B9$ = LEFT$(B8$,34) + "? for help" + LEFT$(B8$,35):CF$ = "GRADEBOOK"
BB 240 FOR I = 0 TO NG:G(0,I) = 100: NEXT I
44 250 T$ = N$(2)
CS 260 REM DISPLAY GRID AND TITLES
90 270 IF AF = 1 THEN 2820
ED 280 T1 = 20: HOME :M$ = "Copyright 1988 COMPUTE! Publications, Inc. All rights reserved.": GOSUB 430: PRINT "Perfect scores";: HTAB T1: PRINT W$
8C 290 PRINT "% of weighted avg.": HTAB T1: PRINT W$
59 300 PRINT W1$: PRINT " Names": HTAB T1: PRINT W$
82 310 IF BY > NS - 14 THEN BY = NS - 14
87 320 IF BX > NG - 15 THEN BX = NG - 15
5C 330 MY = BY + 14:MX = BX + 14
89 340 H = T1 + 1: FOR I = BX TO MX: VTAB

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5: HTAB H:N$ = STR$(I + 1): GOSUB 490: VTAB 2: HTAB H:N$ = STR$(G(0,I)): GOSUB 490: VTAB 3: HTAB H:N$ = STR$(G(1,I)): GOSUB 490:H = H + 4: NEXT :LC = 4: VTAB 5: PRINT
82 350 FOR J = BY TO MY:LC = LC + 1: IF LC = 5 THEN LC = 0: PRINT W1$
88 360 HTAB 1: PRINT N$(J);: HTAB T1: PRINT W$;:H = T1 + 1
8C 370 FOR I = BX TO MX: HTAB H:N$ = STR$(G(J,I)): GOSUB 490
84 380 H = H + 4: NEXT I: PRINT
72 390 NEXT J
93 400 GOTO 540
59 410 GOSUB 430: VTAB 1: GET C$
29 420 M$ = "Wait a moment"
D1 430 NORMAL : HTAB 1: VTAB 1: PRINT B8$: VTAB 1: HTAB 1:C = 40 - LEN(M$) / 2: PRINT LEFT$(B8$,C);: INVERSE : PRINT M$: NORMAL : RETURN
99 440 NORMAL : HTAB 1: VTAB 1: PRINT B8$: HTAB 1: VTAB 1: PRINT M$;"(Enter ? for directory)": INPUT FI$: IF FI$ = "?" THEN 470
D1 450 IF RIGHT$(FI$,4) < > ".grd" AND RIGHT$(FI$,4) < > ".GRD" THEN FI$ = FI$ + ".GRD"
1D 460 GOTO 420
9F 470 HOME : PRINT : PRINT D$"CATALOG": PRINT "any key to continue": GET C$: DD = 1: GOTO 440
E7 480 REM pad with spaces and print sub
13 490 IF LEN(N$) < 3 THEN PRINT LEFT$(B1$,3 - LEN(N$));
38 500 PRINT N$;: RETURN
24 510 PRINT SPC(3 - LEN(STR$(T)));T: RETURN
85 520 DY = - ROW:DX = 0: GOTO 890
93 530 DY = 14 - ROW:DX = 0: GOTO 890
F6 540 HTAB 1: VTAB 1: NORMAL : PRINT B9$
4A 550 VTAB 1: PRINT : HTAB TX: VTAB TY: INVERSE :MS = 3: IF COL = 0 THEN MS = T1 - 1
3E 560 IF LEN(T$) < MS THEN R$ = T$ + LEFT$(BL$,MS - LEN(T$)): PRINT R$: GOTO 580
11 570 PRINT T$
D8 580 NORMAL
8A 590 A = PEEK(49152): IF A < 128 THEN 590
26 600 A = A - 128:A$ = CHR$(A): POKE - 1,6368,0
F0 610 CM = C(A): IF CM < 1 THEN 590
86 620 ON CM GOTO 630,640,680,740,740,720,740,1250,1340,1350,1400,1610,1700,1720,2140,2300,2630,3300,590,3800,520,530
57 630 IF COL > 0 THEN 550
89 640 T$ = RIGHT$(T$ + A$,MS)
87 650 HTAB TX: VTAB TY: PRINT T$
A2 660 GOTO 550
88 670 REM DELETE PRESSED
9F 680 IF LEN(T$) < 2 THEN T$ = "": GOTO 650
81 690 T$ = LEFT$(T$, LEN(T$) - 1)
18 700 GOTO 650
89 710 REM carriage return, down cursor, up, left, right cursor
45 720 B = PEEK(-16287): IF BX + COL = 0 AND B < 128 THEN 670
9E 730 GOTO 750
18 740 B = PEEK(-16287)
A2 750 DD = 0: IF B < 128 THEN 840
53 760 GOSUB 1270:T = CM - 4:DX = DX(T):DY

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```

      = DY(T)
2C 770 IF (BX = 0 AND DX < 0) OR (BX > = N
      G - 15 AND DX = 1) OR (BY = 2 AND D
      Y < 0) OR (BY > = NS - 14 AND DY =
      1) THEN 550
DF 780 BX = BX + DX * 14:BY = BY + DY * 14
      : VTAB 1: IF BX > NG - 15 THEN BX =
      NG - 15
D0 790 IF BY < 2 THEN BY = 2
85 800 IF BY > NS - 14 THEN BY = NS - 14
3D 810 IF BX < 0 THEN BX = 0
77 820 IF BX > 0 AND COL < 2 THEN COL = 2
66 830 GOSUB 1300: GOTO 1110
F9 840 HTAB 1: VTAB 1: NORMAL : PRINT B9$
D4 850 T = CM - 4:DX = DX(T):DY = DY(T)
40 860 IF DX > 0 AND BX + COL > = NG THEN
      550
C1 870 IF DY > 0 AND BY + ROW > = NS THEN
      550
18 880 IF DY < 0 AND BY + ROW < = 0 THEN 5
      50
01 890 RX = COL + BX - 1:RY = ROW + BY: IF
      RX < 0 THEN N$(RY) = T$: HTAB 1: V
      TAB TY: PRINT BL$: HTAB 1: VTAB TY:
      PRINT T$: GOTO 930
7A 900 V = VAL (T$): IF V > G(0,RX) AND RO
      W > = 0 THEN M$ = "Warning - grade
      greater than perfect score": GOSUB
      430
97 910 G(RY,RX) = VAL (T$): HTAB TX: VTAB
      TY: PRINT "      ": HTAB TX: VTAB TY
6A 920 N$ = STR$ (G(RY,RX)): GOSUB 490
23 930 ROW = ROW + DY:COL = COL + DX
63 940 IF BY = 2 AND ROW < 0 AND COL + BX
      = 0 THEN COL = 1: GOTO 980
A6 950 IF BY > 2 AND ROW < 0 AND DY < 0 TH
      EN ROW = ROW - DY * 10: GOTO 1020
83 960 IF BX > 0 AND COL < 0 AND DX < 0 TH
      EN COL = COL - DX * 10: GOTO 1020
F5 970 IF ROW > 14 OR ROW < - 2 OR (BX > 0
      AND COL = 1) OR COL < 0 OR COL > 1
      5 THEN ROW = ROW - DY * 10:COL = CO
      L - DX * 10: GOTO 1020
D8 980 GOSUB 1300
A8 990 GOTO 550
33 1000 REM EXTENDED MOVEMENT
21 1010 RX = BX + COL:RY = BY + ROW
0C 1020 BY = BY + DY * 10:BX = BX + DX * 1
      0
53 1030 IF (RX = > NG AND DX > 0) OR (RY >
      = NS AND DY > 0) OR (RY < = 0 AND
      DY < 0) THEN 540
97 1040 IF BX < 0 THEN BX = 0:COL = RX - B
      X + 1
2A 1050 IF BX > NG - 15 THEN COL = RX - BX
      + 1:BX = NG - 15
9A 1060 IF BY < 2 THEN BY = 2:ROW = RY - B
      Y
2A 1070 IF BY > NS - 14 THEN BY = NS - 14:
      ROW = RY - BY
57 1080 GOSUB 1300
B2 1090 IF BY + ROW = 2 AND DY < 0 THEN RO
      W = - 1
B9 1100 REM show numbers only
8C 1110 MX = BX + 14: IF MX > NG THEN MX =
      NG
06 1120 MY = BY + 14: IF MY > NS THEN MY =
      NS
B9 1130 LC = 4:H2 = 6: IF DX = 0 THEN 1150
68 1140 VTAB 2:H = T1 + 1: FOR I = BX TO M
      X: HTAB H: VTAB 2:T = G(0,I): GOSU
      B 510: HTAB H: VTAB 3:T = G(1,I):
      GOSUB 510: HTAB H: VTAB 5:T = I +
      1: GOSUB 510:H = H + 4: NEXT

```

```

31 1150 VTAB 6: IF DY < > 0 OR B > 127 THE
      N 1200
D9 1160 FOR J = BY TO MY:LC = LC + 1: IF L
      C = 5 THEN LC = 0: PRINT
B1 1170 IF N$(J) = "" THEN PRINT NB$: GOTO
      1190
2C 1180 H = T1 + 1: FOR I = BX TO MX: HTAB
      H:N$ = STR$ (G(J,I)): GOSUB 490:H
      = H + 4: NEXT I: PRINT
4A 1190 NEXT J: GOSUB 1300: GOTO 540
C3 1200 FOR J = BY TO MY:LC = LC + 1: IF L
      C = 5 THEN LC = 0: PRINT
92 1210 IF N$(J) = "" THEN PRINT NB$: GOTO
      1240
31 1220 H = T1 + 1: PRINT N$(J): SPC( 19 -
      LEN (N$(J)));
30 1230 FOR I = BX TO MX: HTAB H:N$ = STR$
      (G(J,I)): GOSUB 490:H = H + 4: NE
      XT I: PRINT
38 1240 NEXT J: GOSUB 1300: GOTO 540
69 1250 IF BX = 0 AND COL = 0 THEN 640
82 1260 CM = 7: GOTO 840
6E 1270 RX = COL + BX - 1:RY = ROW + BY: I
      F RX < 0 THEN N$(RY) = T$: GOTO 13
      00
B8 1280 V = VAL (T$): IF V > G(0,RX) AND R
      OW > = 0 THEN M$ = "Warning - grad
      e greater than perfect score": GOS
      UB 430
79 1290 G(RY,RX) = VAL (T$)
A1 1300 RT$ = T$:TY = 7 + ROW + INT (ROW /
      5):TX = 17 + COL * 4:MS = 3: IF C
      OL = 0 AND BX = 0 THEN TX = 1:MS =
      19:T$ = N$(ROW + BY): RETURN
4F 1310 IF BY + ROW < 2 THEN TY = 4 + ROW
31 1320 RV = G(ROW + BY,BX + COL - 1):T$ =
      STR$ (RV): IF T$ = "0" THEN T$ =
      ""
E3 1330 RETURN
0A 1340 T$ = "": GOTO 550
58 1350 GOSUB 1270:M$ = "Are you sure you
      want to quit (y/n)?: GOSUB 410
15 1360 IF C$ = "n" OR C$ = "N" THEN 540
96 1370 IF C$ < > "y" AND C$ < > "Y" THEN
      M$ = "Exit program (y/n)?: GOSUB
      410: GOTO 1360
C5 1380 PRINT : PRINT D$"PR#3": PRINT : EN
      D
71 1390 REM Print
C4 1400 GOSUB 1270:M$ = "Print : Row, Colu
      mn or All (r,c,a)?: GOSUB 410
A8 1410 IF C$ = "R" OR C$ = "r" OR C$ = "C
      " OR C$ = "c" OR C$ = "A" OR C$ =
      "a" THEN 1430
62 1420 GOTO 1400
D2 1430 PRINT : PRINT D$"PR#1":MX = BX + 1
      4: IF MX > NG THEN MX = NG
12 1440 X1 = BX:X2 = MX:Y1 = 2:Y2 = NS:P$
      = W1$
28 1450 IF C$ = "C" OR C$ = "c" THEN X1 =
      BX + COL - 1:X2 = X1:P$ = LEFT$ (P
      $,T1 + 4): GOTO 1530
1D 1460 IF C$ = "R" OR C$ = "r" THEN Y1 =
      BY + ROW:Y2 = Y1
8D 1470 PRINT "Perfect scores" SPC( 5);Z$;
C7 1480 FOR I = X1 TO X2:N$ = STR$ (G(0,I)
      ): GOSUB 490: PRINT Z$;: NEXT : PR
      INT
A3 1490 PRINT "Percentage"; SPC( 9);Z$;: F
      OR I = X1 TO X2:N$ = STR$ (G(1,I))
      : GOSUB 490: PRINT Z$;: NEXT : PRI
      NT
17 1500 PRINT W1$
A3 1510 PRINT "Name"; SPC( 15);Z$;: FOR I

```



```

      = X1 TO X2:N$ = STR$ (I + 1): GOSUB
      B 490: PRINT Z$;: NEXT : PRINT
7A 1520 GOTO 1550
D2 1530 IF X1 < 0 THEN X1 = 0:X2 = 0
6D 1540 PRINT "Names"; SPC( 14);Z$;:N$ = S
      TR$ (X1 + 1): GOSUB 490: PRINT Z$
88 1550 LC = 4
C8 1560 FOR J = Y1 TO Y2:LC = LC + 1: IF L
      C = 5 THEN LC = 0: PRINT P$
D2 1570 IF N$(J) = "" AND G(J,0) = 0 THEN
      J = Y2: GOTO 1600
CC 1580 PRINT N$(J); SPC( 19 - LEN (N$(J))
      );Z$;
88 1590 FOR I = X1 TO X2:N$ = STR$ (G(J,I)
      ): GOSUB 490: PRINT Z$;: NEXT I: P
      RINT
79 1600 NEXT : PRINT : PRINT D$"PR#3": PRI
      NT : GOTO 270
60 1610 M$ = "Delete row or column (r,c)?"
      : GOSUB 410
D0 1620 DX = 0:DY = 0: IF C$ = "R" OR C$ =
      "r" THEN DY = .1: GOTO 1670
51 1630 IF C$ < > "C" AND C$ < > "c" THEN
      DX = .1: GOTO 1610
ED 1640 IF COL + BX = 0 THEN M$ = "Can not
      delete name column": GOSUB 430: G
      OTO 550
5C 1650 FOR J = 0 TO NS: FOR I = COL + BX
      TO NG
89 1660 G(J,I - 1) = G(J,I): NEXT :G(J,NG)
      = 0: NEXT :DY = 0:DX = .1: GOTO 1
      110
96 1670 IF ROW < 0 THEN M$ = "Can not dele
      te this row": GOSUB 430: GOTO 550
6E 1680 FOR J = BY + ROW + 1 TO NS:N$(J -
      1) = N$(J)
68 1690 FOR I = 0 TO NG:G(J - 1,I) = G(J,I)
      ): NEXT : NEXT :N$(NS) = "": FOR I
      = 0 TO NG:G(NS,I) = 0: NEXT : GOS
      UB 1300: GOTO 1110
83 1700 GOSUB 1270:DD = 0
C0 1710 M$ = "Save: Enter filename ": GOSU
      B 440
C1 1720 IF FI$ = ".GRD" THEN 1900
D9 1730 ONERR GOTO 1800
E1 1740 PRINT : PRINT D$"VERIFY"FI$
88 1750 POKE 216,0
33 1760 M$ = "File " + FI$ + " already exi
      sts, overwrite old file (y/n)?: G
      OSUB 410
AC 1770 IF C$ = "n" OR C$ = "N" THEN 1710
07 1780 IF C$ = "y" OR C$ = "Y" THEN 1800
A2 1790 GOTO 1760
A9 1800 POKE 216,0
97 1810 PRINT : PRINT D$"OPEN"FI$: PRINT D
      $"WRITE"FI$: PRINT CF$
20 1820 FOR J = 0 TO NS:T = LEN (N$(J)): I
      F T > 0 OR J < 3 THEN 1870
74 1830 EF = 0
BE 1840 FOR I = 0 TO NG - 1: IF G(J,I) THE
      N EF = 1
8F 1850 NEXT I
3F 1860 IF EF = 0 THEN J = NS: GOTO 1880
9F 1870 NW = J: PRINT T: PRINT N$(J);: FOR
      I = 0 TO NG + 2: PRINT G(J,I): NE
      XT
45 1880 NEXT J: PRINT 1000
8A 1890 PRINT D$"CLOSE"FI$: PRINT :M$ = "S
      ave complete - " + STR$ (NW - 1) +
      " records saved, resume data entr
      y.": GOSUB 430
A0 1900 IF DD = 1 THEN 270
E8 1910 GOTO 550
8F 1920 GOSUB 1270:DD = 0
85 1930 M$ = "Load: Enter filename ": GOSU
      B 440
5D 1940 IF FI$ = ".GRD" THEN 2120
07 1950 ONERR GOTO 2060
4A 1960 PRINT : PRINT D$"VERIFY"FI$: PRIN
      T D$"OPEN"FI$: PRINT D$"READ"FI$
C7 1970 POKE 216,0
69 1980 INPUT R$: IF R$ < > CF$ THEN M$ =
      "File is not a Gradebook data file
      , abort or retry (a/r)?: PRINT D$
      "CLOSE"FI$: GOTO 2080
81 1990 SN = NS + 1: FOR J = 0 TO NS: INPU
      T T: IF T > 999 THEN SN = J:J = NS
      : GOTO 2020
67 2000 IF T > 0 THEN N$ = "": FOR I = 1 T
      O T: GET R$:N$ = N$ + R$: NEXT :N$
      (J) = N$
9A 2010 FOR I = 0 TO NG + 2: INPUT G(J,I):
      NEXT
75 2020 NEXT J
FD 2030 IF SN > = NS THEN 2050
44 2040 M$ = STR$ (SN - 2) + " records loa
      ded, wait for screen update.": GOS
      UB 430: FOR J = SN TO NS:N$(J) = "
      ": FOR I = 0 TO NG + 2:G(J,I) = 0:
      NEXT : NEXT
57 2050 PRINT D$"CLOSE"FI$:ROW = 0:COL = 0
      :BX = 0:BY = 2: GOSUB 1300: GOTO 2
      70
22 2060 POKE 216,0: PRINT D$"CLOSE"
89 2070 M$ = "File not found, abort or ret
      ry (a/r)?"
48 2080 GOSUB 410
D3 2090 IF C$ = "r" OR C$ = "R" THEN 1930
41 2100 IF C$ < > "a" AND C$ < > "A" THEN
      M$ = "Abort or retry (a/r)?: GOTO
      2080
3E 2110 GOSUB 1300
99 2120 IF DD = 1 THEN 270
DF 2130 GOTO 540
36 2140 GOSUB 1270: HOME : PRINT "Gradeboo
      k Command Summary"
99 2150 PRINT : PRINT "Use cursor keys to
      move around.": PRINT " Hold down t
      he APPLE key, while pressing curso
      r keys for extended movement."
40 2160 PRINT "<return> moves down"
8F 2170 PRINT "<esc> clears a field"
48 2180 PRINT "<space> moves right to the
      next grade field, enters space in
      name field."
68 2190 PRINT : INVERSE : PRINT "Control k
      eys:": NORMAL
E2 2200 PRINT "F front and top of entire g
      radebook"
C1 2210 PRINT "T top of current screen"
F5 2220 PRINT "B bottom of current screen"
13 2230 PRINT "L load a file from disk": P
      RINT "S save a file to disk"
68 2240 PRINT "D delete a row or column":
      PRINT "A calculates averages"
89 2250 PRINT "O puts column in order (sor
      t column)": PRINT "P output to the
      printer": PRINT "R report maker"
89 2260 PRINT "Q or E to exit"
81 2270 PRINT "? displays this screen"
18 2280 PRINT : PRINT "any key to continue
      ": GET C$: GOTO 270
83 2290 REM complicated sort routine
72 2300 GOSUB 1270
1C 2310 M$ = "Control O - sort in progress
      ...": GOSUB 430
8F 2320 H = 2:NF = 0:I2 = COL + BX - 1: IF
      I2 < 0 THEN I2 = 1

```

```

AF 2330 FOR J = NS TO 2 STEP - 1: IF G(J,I
2) OR N$(J) < > "" THEN H = J:J =
2
B3 2340 NEXT J
B4 2350 IF H < 3 THEN 270
AE 2360 FOR J = 2 TO H:N2$(J) = N$(J): NEX
T
CE 2370 FOR I = 2 TO NS:A(I) = I:B(I) = I:
NEXT
AF 2380 SIZE = 1:I2 = COL + BX - 1
B7 2390 A = 2
71 2400 P1 = A:P2 = A + SIZE:PB = A:MP = A
+ SIZE * 2
41 2410 IF MP > H THEN MP = H + 1
18 2420 IF P2 > = MP THEN FOR I = P1 TO A
+ SIZE - 1:B(PB) = A(I):PB = PB +
1: NEXT : GOTO 2520
BE 2430 IF I2 < 0 THEN 2460
FA 2440 IF G(A(P1),I2) > G(A(P2),I2) THEN
B(PB) = A(P1):P1 = P1 + 1:PB = PB
+ 1: GOTO 2500
BC 2450 GOTO 2470
A1 2460 IF N2$(A(P1)) < N2$(A(P2)) THEN B(
PB) = A(P1):P1 = P1 + 1:PB = PB +
1: GOTO 2500
F3 2470 B(PB) = A(P2):P2 = P2 + 1:PB = PB
+ 1
30 2480 IF P2 > = MP THEN FOR I = P1 TO A
+ SIZE - 1:B(PB) = A(I):PB = PB +
1: NEXT : GOTO 2520
BC 2490 GOTO 2430
CB 2500 IF P1 > = A + SIZE THEN FOR I = P2
TO MP:B(PB) = A(I):PB = PB + 1: N
EXT : GOTO 2520
6E 2510 GOTO 2430
49 2520 A = A + SIZE * 2: IF A > = H THEN
2540
6A 2530 GOTO 2400
2E 2540 FOR I = 2 TO H:A(I) = B(I): NEXT
35 2550 SIZE = SIZE * 2: IF SIZE > H THEN
2570
9B 2560 GOTO 2390
B4 2570 FOR J = 2 TO H
DF 2580 R = A(J):R$ = N$(R): IF R$ = NULL$
THEN R$ = ""
7A 2590 N$(J) = N2$(R)
22 2600 FOR I = 0 TO NG + 2:G$(J,I) = G(R,
I): NEXT : NEXT
46 2610 FOR J = 2 TO H: FOR I = 0 TO NG +
2:G(J,I) = G$(J,I): NEXT : NEXT
48 2620 BY = 2:ROW = 0: GOSUB 1300: GOTO 2
70
AB 2630 GOSUB 1270:LY = 2:AF = 1
30 2640 TT = 0: FOR I = 0 TO NG - 1:TT = T
T + G(1,I):G(NS + 1,I) = 0:G(NS +
2,I) = 0: NEXT I
04 2650 H = 2: FOR J = NS TO 2 STEP - 1: I
F N$(J) < > "" THEN H = J:J = 2
34 2660 G(J,NG + 1) = 0:G(J,NG + 2) = 0: N
EXT J
3A 2670 M$ = "Calculating averages for " +
STR$(H - 1) + " students": GOSUB
430
70 2680 TG = 0: FOR J = 2 TO H:T3 = 0:TN =
0: FOR I = 0 TO NG - 1
85 2690 IF G(J,I) > 0 THEN TN = TN + 1:G(NS
+ 1,I) = G(NS + 1,I) + 1:G(NS +
2,I) = G(NS + 2,I) + G(J,I):T3 = T
3 + G(J,I): IF I > TG THEN TG = I
3E 2700 NEXT :G(J,NG + 1) = T3
7F 2710 NEXT J
70 2720 T5 = 0: FOR I = 0 TO TG:T5 = T5 +
G(0,I): NEXT
AD 2730 FOR I = 0 TO TG
40 2740 IF G(NS + 1,I) > 0 THEN G(NS + 2,I
) = G(NS + 2,I) / G(NS + 1,I)
C4 2750 NEXT
2D 2760 FOR J = 0 TO H:G(J,NG + 1) = INT (
G(J,NG + 1) / T5 * 100): NEXT
94 2770 IF TT < > 100 THEN 2820
AB 2780 REM calc weighted averages
1D 2790 FOR J = 2 TO H:T4 = 0: FOR I = 0 T
O TG
58 2800 IF G(0,I) > 0 THEN T4 = G(J,I) * G
(1,I) / G(0,I) + T4
C5 2810 NEXT :G(J,NG + 2) = T4: NEXT
87 2820 HOME : PRINT "Avg. Display: contro
l commands - P print, O sort, R re
port, N normal display": PRINT
4A 2830 T1 = 20:W1$ = "": FOR I = 1 TO 79:
W1$ = W1$ + "-": NEXT
8B 2840 LC = 4
C7 2850 A3$ = A2$ + A2$ + Z$
6B 2860 PRINT "Names";: HTAB T1: PRINT A3$
;: HTAB T1 + 1: PRINT "AVG";: HTAB
T1 + 5: PRINT "Wav"
CB 2870 HY = LY + 14:LC = 4: IF HY > H THE
N HY = H
9A 2880 FOR J = LY TO HY:LC = LC + 1: IF L
C = 5 THEN LC = 0: PRINT LEFT$(W1
$,T1 + 8)
90 2890 PRINT N$(J);: HTAB T1: PRINT A3$;:
HTAB T1 + 1:N$ = STR$(G(J,NG + 1
)): GOSUB 490: HTAB T1 + 5:N$ = ST
R$(INT(G(J,NG + 2))): GOSUB 490
: PRINT
7F 2900 NEXT J
DB 2910 V = 3:AX = 34:G1 = 0:G2 = - 1:I2 =
0
9B 2920 HTAB AX: VTAB V: PRINT "Averages o
n each assignment, zeroes excluded
":V = V + 1
9E 2930 G1 = G2 + 1:G2 = G1 + 9: IF G2 > T
G THEN G2 = TG
DB 2940 HTAB AX: VTAB V: PRINT "# ";Z$
23 2950 HTAB AX: VTAB V + 1: PRINT "Avg";Z
$
22 2960 H3 = AX + 4: FOR I = G1 TO G2: HTA
B H3: VTAB V:N$ = STR$(I + 1): GO
SUB 490: PRINT Z$: HTAB H3: VTAB V
+ 1:N$ = STR$(INT(G(NS + 2,I))
): GOSUB 490: PRINT Z$:H3 = H3 + 4
: NEXT
83 2970 IF G2 < TG - 1 THEN V = V + 3: GOT
O 2930
20 2980 A = PEEK(49152): IF A < 128 THEN
2980
29 2990 A = A - 128:A$ = CHR$(A): POKE -
16368,0
2E 3000 CM = C(A): IF CM < 1 THEN 2980
FC 3010 ON CM GOTO 2980,2980,2980,3030,303
0,2980,2980,2980,2980,2980,3160,29
80,2980,2980,2980,3070,2980,3110,3
280
87 3020 GOTO 2980
23 3030 D2 = 14: IF CM = 5 THEN D2 = - D2
CB 3040 LY = LY + D2: IF LY > NS - 14 THEN
LY = NS - 14
3C 3050 IF LY < 2 THEN LY = 2
7D 3060 GOTO 2820
9E 3070 COL = 1:M$ = "Sort names, averages
, weighted averages (n/a/w)?:": GOS
UB 410
FC 3080 IF C$ = "w" OR C$ = "W" THEN BX =
NG + 2: GOTO 2310
10 3090 IF C$ = "a" OR C$ = "A" THEN BX =
NG + 1: GOTO 2310
C6 3100 BX = 0:COL = 0: GOTO 2310

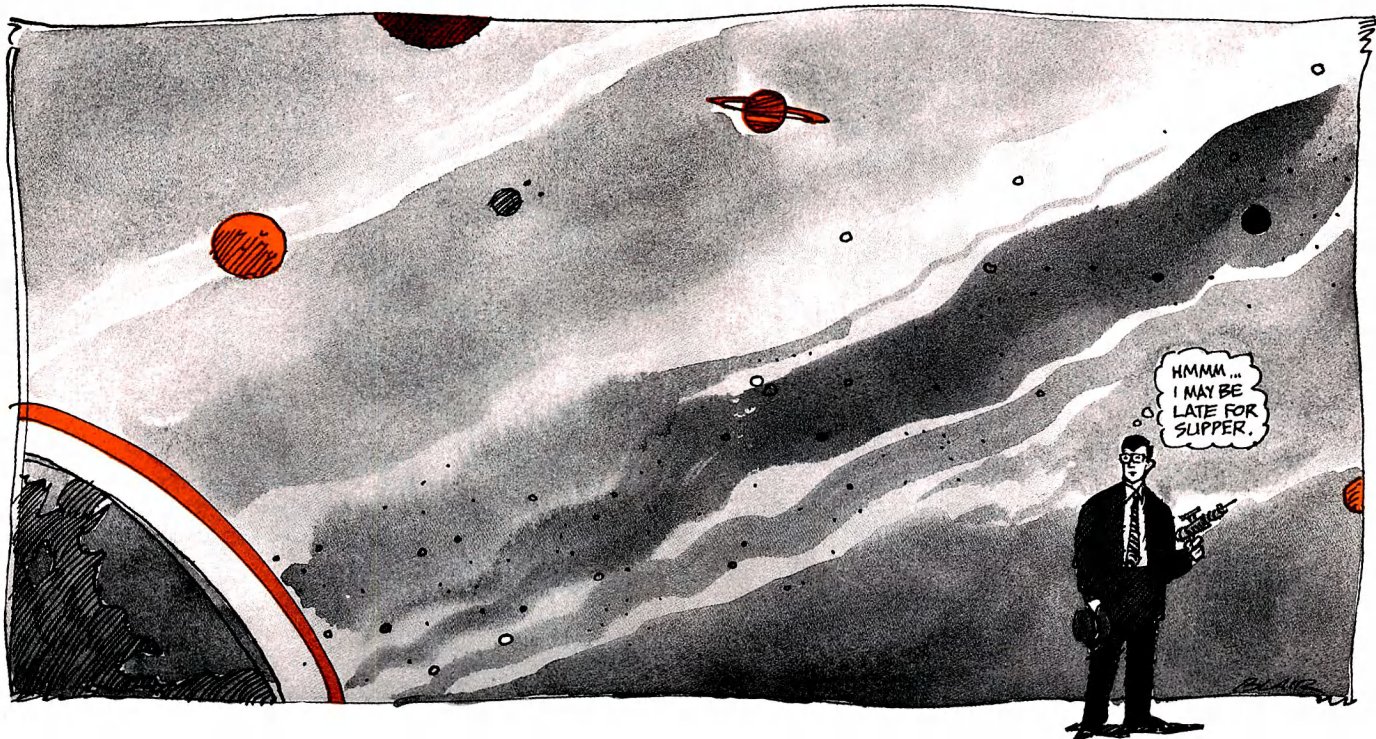
```



```

76 3110 M$ = "Report on averages, weighted
    averages (a/w)?: GOSUB 410
IF 3120 T3 = 0: G(0, NG + 1) = 100: G(0, NG +
    2) = 100
#7 3130 IF C$ = "a" OR C$ = "A" THEN COL =
    1: BX = NG + 1: GOTO 3310
CB 3140 IF C$ = "w" OR C$ = "W" THEN COL =
    1: BX = NG + 2: GOTO 3310
6A 3150 GOTO 3110
7E 3160 M$ = "Printing averages...": GOSUB
    430
94 3170 PRINT : PRINT D$ "PR#1": PRINT "Nam
    es": SPC( 15); Z$; "AVG"; Z$; "Wav"; Z$
    : LC = 4
7B 3180 FOR J = 2 TO NS: IF N$(J) = "" AND
    G(J, NG + 1) = 0 AND G(J, NG + 2) =
    0 THEN 3210
67 3190 LC = LC + 1: IF LC = 5 THEN LC = 0
    : PRINT LEFT$( W1$, T1 + 8)
26 3200 PRINT N$(J); SPC( 20 - LEN (N$(J))
    ); Z$; N$ = STR$( INT (G(J, NG + 1)
    )); GOSUB 490: PRINT Z$; N$ = STR$(
    INT (G(J, NG + 2))); GOSUB 490:
    PRINT Z$
76 3210 NEXT J
76 3220 G1 = 0: G2 = - 1: PRINT : PRINT "Av
    erages on each assignment, zeroes
    excluded"
59 3230 G1 = G2 + 1: G2 = G2 + 10: IF G2 >
    TG THEN G2 = TG
49 3240 PRINT "# "; FOR I = G1 TO G2:
    PRINT Z$; N$ = STR$( I + 1): GOSUB
    490: NEXT : PRINT Z$
F3 3250 PRINT "Avg. "; FOR I = G1 TO G2:
    PRINT Z$; N$ = STR$( INT (G(NS +
    2, I))); GOSUB 490: NEXT : PRINT Z$
    : PRINT
AI 3260 IF G2 < TG - 1 THEN 3230
6A 3270 PRINT D$ "PR#3": PRINT : GOTO 2820
#5 3280 AF = 0: BY = 2: BX = 0: ROW = 0: COL =
    0: GOSUB 1300: GOTO 270
65 3290 REM Report on a Student or an Assi
    gnment
73 3300 GOSUB 1270
#9 3310 DD = 0: M$ = "Output to screen or p
    rinter (s/p)?: GOSUB 410
C9 3320 IF C$ = "P" OR C$ = "p" THEN DD =
    2: GOTO 3340
62 3330 IF C$ < > "s" AND C$ < > "S" THEN
    M$ = "Choose S for screen, P for p
    rinter?": GOSUB 410: GOTO 3320
B6 3340 IF AF = 0 THEN M$ = "Report on row
    or column (r/c)?: GOSUB 410
56 3350 IF DD = 2 THEN VTAB 1: PRINT : PRI
    NT D$ "PR#1": GOTO 3370
58 3360 HOME
9A 3370 IF C$ = "C" OR C$ = "c" OR AF = 1
    THEN 3530
60 3380 IF C$ < > "R" AND C$ < > "r" THEN
    PRINT : PRINT D$ "PR#3": GOTO 3340
29 3390 RY = ROW + BY: IF RY < 2 THEN RY =
    0
F2 3400 PRINT "Summary for student #"; RY -
    1; " "; N$(RY)
05 3410 T3 = 0: T4 = 0: TG = 0: FOR I = 0 TO
    NG - 1: G = G(RY, I): IF G > 0 THEN
    TG = I: T3 = T3 + G: IF G(0, I) > 0
    THEN T4 = T4 + G * G(1, I) / G(0, I
    )
B3 3420 NEXT
06 3430 PRINT : H2 = 0: G1 = 0: G2 = - 1: BI =
    0: BE = G(RY, 0)
98 3440 G1 = G2 + 1: G2 = G1 + 17: IF G2 >
    TG THEN G2 = TG
51 3450 PRINT "# "; FOR I = G1 TO G2:
    PRINT Z$; N$ = STR$( I + 1): GOSU
    B 490: NEXT : PRINT Z$
09 3460 PRINT "Grade "; FOR I = G1 TO G2:
    PRINT Z$; N$ = STR$( G(RY, I)): GO
    SUB 490: NEXT : PRINT Z$
05 3470 IF G2 < TG THEN PRINT : GOTO 3440
E4 3480 TT = 0: FOR I = 0 TO NG - 1: TT = G
    (1, I) + TT: IF G(RY, I) > BE THEN B
    E = G(RY, I): BI = I
CF 3490 NEXT
77 3500 PRINT : PRINT "Straight average of
    " INT (T3 / (TG + 1))" for "TG +
    1" assignments."
A7 3510 IF TT = 100 THEN PRINT : PRINT "We
    ighted average (total): "T4
8E 3520 GOTO 3780
94 3530 RX = COL + BX - 1: IF RX < 0 THEN
    RX = 0
E8 3540 IF RX < NG THEN 3570
CB 3550 IF RX = NG + 1 THEN PRINT "Summary
    report on averages": GOTO 3580
5F 3560 PRINT "Summary of weighted average
    s": GOTO 3580
IF 3570 PRINT "Assignment #"; RX + 1; " grad
    e summary"
98 3580 H = 2: FOR J = NS TO 2 STEP - 1: I
    F N$(J) < > "" OR G(J, RX) > 0 THEN
    H = J: J = 2
01 3590 NEXT
05 3600 PRINT : PRINT "Grade distribution"
FF 3610 FOR I = 0 TO 10: BG(I) = 0: NEXT
58 3620 FOR J = 2 TO H: T = 0: IF G(0, RX) T
    HEN T = INT (G(J, RX) / G(0, RX) * 1
    0)
89 3630 IF T > 10 THEN T = 10
72 3640 BG(T) = BG(T) + 1: NEXT J
A8 3650 N$ = STR$( INT (G(0, RX))) + " +":
    PRINT N$; PRINT SPC( 11 - LEN (N
    $)); IF BG(10) THEN FOR I = 1 TO
    BG(10): PRINT "x"; NEXT
8F 3660 PRINT : T = INT (G(0, RX) + .9999)
19 3670 FOR I = 9 TO 0 STEP - 1
5C 3680 TH = T: T = INT (G(0, RX) * I / 10 +
    .9999)
29 3690 IF TH - 1 < = T THEN N$ = STR$( T)
    : GOTO 3710
26 3700 N$ = STR$( T) + " to " + STR$( TH
    - 1)
28 3710 PRINT N$; PRINT SPC( 11 - LEN (N$
    )); IF BG(I) THEN FOR J = 1 TO BG
    (I): PRINT "x"; NEXT J
#3 3720 PRINT : NEXT I
CA 3730 T3 = 0: B = G(2, RX): FOR J = 2 TO H
    : IF G(J, RX) > B THEN B = G(J, RX)
E8 3740 T3 = T3 + G(J, RX): NEXT : T3 = INT
    (T3 / (H - 1)): PRINT : PRINT "Per
    fect score is "G(0, RX); IF AF = 0
    THEN PRINT ", % of total grade is
    "; G(1, RX)
ED 3750 PRINT : PRINT "Average score is ";
    T3
28 3760 C = 0: C$ = " ": PRINT : PRINT "Be
    st score is "B" by"; FOR I = 2 TO
    H: IF G(I, RX) = B THEN PRINT C$; N
    $(I); C$ = " "; C = C + 1: IF C =
    2 THEN C = 0: C$ = ";" + CHR$( 13)
    + BL$
48 3770 NEXT : PRINT
63 3780 IF DD = 0 THEN PRINT "any key to c
    ontinue": GET C$: GOTO 270
83 3790 PRINT D$ "PR#3": PRINT : GOTO 270
79 3800 GOSUB 1270: ROW = 0: BY = 2: COL = 0:
    BX = 0: GOSUB 1300: GOTO 270 aa

```



Galaxy Defender

Chris M. Sebrell

Don't use your computer as a tool; use it as a weapon.

Forget word processing. Forget database management. Give your computer a *real* job: defending the galaxy from the relentless onslaught of 30 alien invasions.

"Galaxy Defender" puts you and your Apple II up against the meanest creatures in the universe. Controlling a small spaceship, you must shoot down entire attack waves of hostile space-invaders. You maneuver your ship using a joystick or the keyboard. Galaxy Defender works on any Apple II with either ProDOS or DOS 3.3.

Preparing for Battle

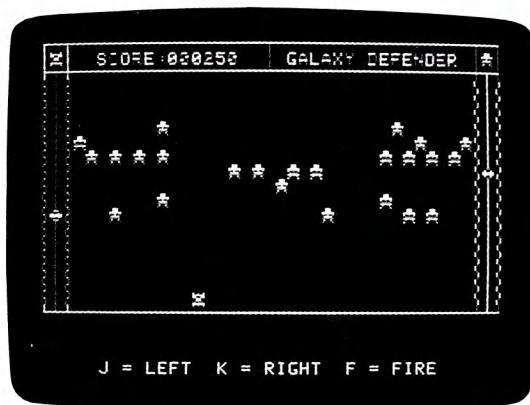
Intergalactic space battle requires preparation in the form of deep meditation, strict self-discipline, and a lot of typing—over 4K of it. But for those who take the time, the reward is a challenging, arcade-action game for your Apple II-series computer.

To enter Galaxy Defender, you need to use "Apple MLX," the machine language entry program found elsewhere in this issue. You don't have to know anything about machine language or machine language programming to type in the game. All you need is a copy of Apple MLX on disk.

Run MLX, and when it asks for the starting and ending addresses, type in the following:

STARTING ADDRESS? 8000
ENDING ADDRESS? 915F

Choose E when the options menu appears and then enter



With 30 levels of increasing speed and difficulty, "Galaxy Defender" is a challenging shoot-'em-up game for the Apple II.

the address where you'd like to start. If you're just beginning to enter Galaxy Defender, type **8000**, for the first address in the listing. After you've finished typing in the data, be sure to save a copy to disk with the filename **GALAXY**.

To run the game, enter **BRUN GALAXY**. The game begins with a title screen and the prompt **PRESS <RETURN> TO CONTINUE**. (If you own an Apple IIGS and want a *real* challenge, try playing Galaxy Defender in fast mode; you'll never know what hit you.) Next, you select joystick or keyboard control by pressing J or K, respectively. A warbled siren warns you of the oncoming alien attack.

Program Key

Key	Function
J	Move left
K	Move right
F	Fire missile
Space bar	Freeze game
Control-Reset	Exit game

This Is Not a Drill

The objective is clear: Destroy all aliens before they reach the bottom of the screen. Using the keyboard or a joystick (depending on which input device you select), you move left, move right, and fire. With the keyboard, the J key moves your ship left, the K key moves your ship right, and the F key fires a missile. You have an unlimited number of missiles, although only one may be in the air at a time.

To freeze the game, hold down the space bar. To resume play, press any other key.

The game starts out on Phase 1, but adept players will advance quickly. The current phase number appears on the screen before each alien attack. You have only one chance to save the galaxy, so be careful; if just one alien breaks your defenses, it's back to Phase 1. After you have shot down all the aliens on the screen, a new phase begins. To complete the game and save the galaxy, you must clear 30 frantic phases of alien invasions.

Galaxy Defender's first four phases are relatively easy, but as the game progresses, there are more and faster aliens. The best strategy for the higher levels is to work on the lowest aliens first. This gives you more time to shoot down the remaining attackers. With 30 levels of nonstop action, however, reaching the end of the game is not an easy task.

Navigating the Screen

No game is complete without a score. In Galaxy Defender, you get 25 points for every alien that you blast out of the sky. Your score is tallied at the upper left corner of the screen.

At the upper right, a picture of the type of alien you're currently fighting appears. Every level has a different breed of alien, and each breed has its own physical quirks: Some appear to *flap* about the screen, while others shrink and expand, making them difficult to pin down. Adding to this visual display, two bouncing sliders move up and down the sides of the screen.

When the program ends, you're prompted to press Return and restart the game. This will reset your score to 0 and bring you back to the title screen. If you wish to exit the program and return to BASIC, simply hold down the Control key and press Reset.

Galaxy Defender

For mistake-proof entry, use "Apple MLX," found elsewhere in this issue, to type in this program.

```

8000: 4C AF 88 00 00 00 00 00 24
8008: 00 00 00 00 00 00 00 00 09
8010: 00 00 00 00 00 00 00 00 11
8018: 00 01 00 00 00 00 00 20 1A
8020: 20 00 21 80 21 00 22 80 2B
8028: 22 00 23 80 23 28 20 AB 49
8030: 20 28 21 AB 21 28 22 AB 90
8038: 22 28 23 AB 23 50 20 D0 AE
8040: 20 50 21 D0 21 50 22 D0 F5
8048: 22 50 23 D0 23 28 22 D0 0B
8050: 22 39 3A 00 25 26 27 26 2E
8058: 2F 25 26 33 FF 43 00 24 63
8060: 30 31 3A 33 2A 28 29 35 B9
8068: 00 19 21 20 20 00 24 30 4F
8070: 2E 31 36 35 26 3C 00 31 42
8078: 36 23 41 40 00 2A 2F 24 B4
8080: 41 FF 22 2D 2D 00 33 2A 33
8088: 28 29 35 34 00 33 26 34 1F
8090: 26 33 37 26 25 FF 34 24 70
8098: 30 33 26 42 18 18 18 18 D0
80A0: 18 18 FF 5B 81 63 81 6B 71
80A8: 81 73 81 7B 81 83 81 8B D7
80B0: 81 93 81 9B 81 A3 81 AB 8A
80B8: 81 B3 81 BB 81 C3 81 CB 3D
80C0: 81 D3 81 DB 81 E3 81 EB EF
80C8: 81 F3 81 FB 81 03 82 0B 9F
80D0: 82 13 82 1B 82 23 82 2B AA
80D8: 82 33 82 3B 82 43 82 4B 5D
80E0: 82 53 82 5B 82 63 82 6B 10
80E8: 82 73 82 7B 82 83 82 8B C2
80F0: 82 93 82 9B 82 A3 82 AB 75
80F8: 82 B3 82 BB 82 C3 82 CB 28
8100: 82 D3 82 DB 82 E3 82 EB DB
8108: 82 F3 82 FB 82 03 83 0B 8B
8110: 83 13 83 1B 83 23 83 2B 96
8118: 83 33 83 3B 83 43 83 4B 49
8120: 83 53 83 5B 83 63 83 6B FB
8128: 83 73 83 7B 83 83 83 8B AE
8130: 83 93 83 9B 83 A3 83 AB 61
8138: 83 B3 83 BB 83 C3 83 CB 14
8140: 83 D3 83 DB 83 E3 83 EB C6
8148: 83 F3 83 FB 83 03 84 0B 76
8150: 84 13 84 1B 84 23 84 2B 81
8158: 84 33 84 00 00 00 00 00 FA
8160: 00 00 00 7F 7F 7F 7F 7F D3
8168: 7F 7F 7F 0B 14 22 77 77 0B
8170: 22 14 0B 0B 0B 0B 0B 0B 83
8178: 0B 0B 0B 00 00 00 7F 00 81
8180: 00 00 00 0B 0B 0B 7F 0B 6B
8188: 0B 0B 0B 00 00 00 78 0B 8B
8190: 0B 0B 0B 00 00 00 0F 0B C0
8198: 0B 0B 0B 0B 0B 0B 0F 00 A1
81A0: 00 00 00 0B 0B 0B 78 00 75
81A8: 00 00 00 0B 0B 0B 78 0B 85
81B0: 0B 0B 0B 0B 0B 0B 0F 0B C1
81B8: 0B 0B 0B 0B 0B 0B 7F 00 A2
81C0: 00 00 00 00 00 00 7F 0B CA
81C8: 0B 0B 0B 00 00 00 1C 3E 49
81D0: 3E 1C 00 49 55 63 14 14 03
81D8: 22 7F 49 1C 1C 7F 6B 55 C2
81E0: 2A 14 0B 1C 1C 7F 49 2A 5C
81E8: 55 22 41 14 22 14 7F 7F 68
81F0: 14 22 14 41 22 14 7F 7F FC
81F8: 14 22 41 00 3E 22 22 22 97
8200: 22 3E 00 00 00 1C 14 14 52
8208: 1C 00 00 04 04 04 0B 10 AB

```



On Disk Only

If you purchase this issue's *COMPUTE!'s Apple Applications Disk*, you'll find the source code for "Galaxy Defender" provided on both sides of the disk. This source file, named GALAXY.S, was created and compiled using the Merlin assembler.

Look for the "On Disk Only" box in all of *Apple Applications' articles*. If a program or article can be enhanced by additional disk files, we'll explain them here and provide them on disk. For more information on ordering *COMPUTE!'s Apple Applications Disk*, see page 29.

8210: 10 10 08 10 10 10 08 04 F7
 8218: 04 04 08 00 0E 11 19 15 1D
 8220: 13 11 0E 00 04 06 04 04 F8
 8228: 04 04 0E 00 0E 11 10 0C D2
 8230: 02 01 1F 00 1F 10 08 0C AF
 8238: 10 11 0E 00 08 0C 0A 09 D8
 8240: 1F 08 08 00 1F 01 0F 10 03
 8248: 10 11 0E 00 1C 02 01 0F 55
 8250: 11 11 0E 00 1F 10 08 04 31
 8258: 02 02 02 00 0E 11 11 0E 04
 8260: 11 11 0E 00 0E 11 11 1E E8
 8268: 10 08 07 00 04 0A 11 11 D3
 8270: 1F 11 11 00 0F 11 11 0F 59
 8278: 11 11 0F 00 0E 11 01 01 E3
 8280: 01 11 0E 00 0F 11 11 11 FB
 8288: 11 11 0F 00 1F 01 01 0F 4A
 8290: 01 01 1F 00 1F 01 01 0F 48
 8298: 01 01 01 00 1E 01 01 01 76
 82A0: 19 11 1E 00 11 11 11 1F 48
 82A8: 11 11 11 00 0E 04 04 04 29
 82B0: 04 04 0E 00 10 10 10 10 68
 82B8: 10 11 0E 00 11 09 05 03 85
 82C0: 05 09 11 00 01 01 01 01 BB
 82C8: 01 01 1F 00 11 1B 15 15 A6
 82D0: 11 11 11 00 11 11 13 15 CC
 82D8: 19 11 11 00 0E 11 11 11 B8
 82E0: 11 11 0E 00 0F 11 11 0F 62
 82E8: 01 01 01 00 0E 11 11 11 B6
 82F0: 15 09 16 00 0F 11 11 0F 73
 82F8: 05 09 11 00 0E 11 01 0E A9
 8300: 10 11 0E 00 1F 04 04 04 2A
 8308: 04 04 04 00 11 11 11 11 92
 8310: 11 11 0E 00 11 11 11 11 A5
 8318: 11 0A 04 00 11 11 11 15 AE
 8320: 15 1B 11 00 11 11 0A 04 7F
 8328: 0A 11 11 00 11 11 0A 04 7F
 8330: 04 04 04 00 1F 10 08 04 08
 8338: 02 01 1F 00 04 04 04 04 A0
 8340: 04 00 04 00 0A 0A 0A 00 56
 8348: 00 00 00 00 02 04 08 08 87
 8350: 08 04 02 00 08 04 02 02 F2
 8358: 02 04 08 00 00 00 00 00 62
 8360: 08 08 04 00 00 00 00 00 ED
 8368: 00 00 04 00 00 00 08 00 FF
 8370: 08 00 00 1C 22 49 45 45 43
 8378: 49 22 1C 7F 2A 14 1C 1E
 8380: 3E 41 41 7F 2A 14 5D 5D D0
 8388: 3E 00 00 00 1C 2A 2A 1C A8
 8390: 1C 2A 49 00 1C 2A 2A 1C 53
 8398: 1C 1C 08 00 3E 55 68 55 29
 83A0: 6B 55 3E 00 3E 6B 55 6B 30
 83A8: 55 6B 3E 00 08 1C 36 63 7D
 83B0: 36 1C 08 00 00 08 1C 3E 71
 83B8: 1C 08 00 00 1C 3E 3E 41 67
 83C0: 41 41 00 00 1C 3E 3E 41 50
 83C8: 22 14 00 1C 3E 1C 14 14 46
 83D0: 14 22 1C 1C 22 14 14 14 4D
 83D8: 1C 3E 1C 00 00 1C 22 22 D7
 83E0: 1C 00 00 00 00 1C 3E 3E 21
 83E8: 1C 00 00 00 3E 1C 22 22 C6
 83F0: 1C 3E 00 00 22 1C 22 22 7D
 83F8: 1C 22 00 1C 3E 3E 1C 1C 97
 8400: 36 63 00 1C 22 22 1C 1C AC
 8408: 36 63 00 55 3E 63 41 41 9D
 8410: 63 3E 55 55 3E 63 5D 5D F1
 8418: 63 3E 55 63 14 36 22 22 23
 8420: 36 14 63 1C 14 36 2A 2A 6F
 8428: 36 14 1C 1C 7F 49 2A 2A 36
 8430: 49 1C 00 1C 7F 2A 49 49 27
 8438: 2A 1C 00 8C 07 80 8E 06 83

8440: 80 8D 08 80 AD 09 80 0A 92
 8448: A8 B9 1D 80 85 FA C8 B9 23
 8450: 1D 80 85 FB AD 08 80 0A 11
 8458: A8 B9 A3 80 85 FC C8 B9 0C
 8460: A3 80 85 FD AD 0A 80 18 9A
 8468: 65 FA 85 FA 90 02 E6 FB 99
 8470: A2 00 A0 00 20 B4 84 20 DB
 8478: B4 84 20 B4 84 20 B4 84 DE
 8480: 20 B4 84 20 B4 84 20 B4 06
 8488: 84 20 B4 84 EE 0A 80 AD 09
 8490: 0A 80 C9 28 D0 14 A9 00 A4
 8498: 8D 0A 80 EE 09 80 AD 09 98
 84A0: 80 C9 14 D0 05 A9 00 8D 48
 84A8: 09 80 AD 08 80 AC 07 80 D1
 84B0: AE 06 80 60 B1 FC 81 FA 28
 84B8: C8 E6 FB E6 FB E6 FB E6 28
 84C0: FB 60 8D 08 80 8E 06 80 DC
 84C8: 8C 07 80 68 85 FA 68 85 DE
 84D0: FB A0 01 B1 FA F0 12 C9 C4
 84D8: FE D0 02 A9 8D 20 F0 FD 3D
 84E0: E6 FA D0 ED E6 FB 4C D1 A6
 84E8: 84 20 FB 84 20 FB 84 AD A8
 84F0: 08 80 AE 06 80 AC 07 80 99
 84F8: 6C FA 00 E6 FA D0 02 E6 6B
 8500: FB 60 A2 A0 A9 3F 20 A8 B2
 8508: FC CA D0 F8 60 A9 00 85 1D
 8510: FA A9 20 85 FB A0 00 A9 6B
 8518: 00 91 FA E6 FA D0 02 E6 5B
 8520: FB A6 FB E0 3F D0 F2 A6 2A
 8528: FA E0 FF D0 EC 60 8E 06 02
 8530: 80 8C 07 80 A2 03 A0 03 EC
 8538: 8C 09 80 8E 0A 80 20 3B 92
 8540: 84 C8 C0 13 D0 F2 A0 03 9F
 8548: E8 E0 25 D0 EB AE 06 80 58
 8550: AC 07 80 60 20 58 FC A9 8F
 8558: 16 85 25 A9 8D 20 F0 FD DB
 8560: 60 00 00 8E 61 85 8C 62 21
 8568: 85 A9 00 85 FA A9 20 85 3D
 8570: FB A0 00 B1 FA 49 7F 91 4A
 8578: FA E6 FA D0 02 E6 FB A6 71
 8580: FB E0 3F D0 EE A6 FA E0 9F
 8588: FF D0 E8 AE 61 85 AC 62 AC
 8590: 85 60 8D 50 C0 8D 53 C0 D0
 8598: 8D 54 C0 8D 57 C0 60 A9 98
 85A0: DF 20 F0 FD A9 88 20 F0 42
 85A8: FD AD 00 C0 10 FB C9 8D 8B
 85B0: F0 08 A9 00 8D 10 C0 4C E5
 85B8: A9 85 A9 A0 20 F0 FD A9 A3
 85C0: 00 8D 10 C0 60 A9 9D 20 42
 85C8: F0 FD A9 91 20 F0 FD 20 FA
 85D0: 54 85 A9 0A 8D 0A 80 A9 7C
 85D8: 06 8D 09 80 A9 06 20 3B 54
 85E0: 84 A9 04 A2 0F 20 3B 84 37
 85E8: CA D0 FA A9 07 20 3B 84 3B
 85F0: A9 0A 8D 0A 80 A9 07 8D EB
 85F8: 09 80 A9 03 20 3B 84 A9 AE
 8600: 1A 8D 0A 80 A9 07 8D 09 54
 8608: 80 A9 03 20 3B 84 A9 0A 6B
 8610: 8D 0A 80 A9 08 8D 09 80 1A
 8618: A9 09 20 3B 84 A9 04 A2 69
 8620: 0F 20 3B 84 CA D0 FA A9 A5
 8628: 08 20 3B 84 A9 08 8D 0A 8F
 8630: 80 A9 07 8D 09 80 A2 00 31
 8638: BD 4D 80 C9 FF F0 07 20 16
 8640: 3B 84 E8 4C 38 86 20 02 0C
 8648: 85 A9 01 8D 0A 80 A9 0B 2C
 8650: 8D 09 80 A2 00 8D 5D 80 D2
 8658: C9 FF F0 07 20 3B 84 E8 B8
 8660: 4C 55 86 A9 0A 8D 0A 80 6F
 8668: A9 0C 8D 09 80 A2 00 8D DB


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8670: 82 80 C9 FF F0 07 20 3B 37
8678: 84 E8 4C 6F 86 20 02 85 C0
8680: 20 C2 84 D0 D2 C5 D3 D3 15
8688: A0 BC D2 C5 D4 D5 D2 CE 3E
8690: BE A0 D4 CF A0 C3 CF CE 3F
8698: D4 C9 CE D5 C5 BA 00 20 F2
86A0: 9F 85 20 54 85 20 C2 84 DE
86A8: CB C5 D9 C2 CF C1 D2 C4 64
86B0: A0 CF D2 A0 CA CF D9 D3 83
86B8: D4 C9 C3 CB BF A0 A8 CB 75
86C0: AF CA A9 BA 00 A9 DF 20 BF
86C8: F0 FD A9 88 20 F0 FD A0 F9
86D0: 00 C0 10 FB C9 CB F0 14 43
86D8: C9 CB F0 10 C9 CA F0 1E 56
86E0: C9 CA F0 1A A9 00 8D 10 BD
86E8: C0 4C CF 86 A9 00 8D 1C 50
86F0: 80 A9 8A 8D 01 8A A9 02 5A
86F8: 8D 00 8A 4C 0D 87 A9 FF BC
8700: 8D 1C 80 A9 8A 8D 01 8A 9E
8708: A9 4D 8D 00 8A A9 00 8D 79
8710: 10 C0 20 54 85 A9 00 8D 01
8718: 0A 80 A9 00 8D 09 80 A9 BC
8720: 06 20 3B 84 A9 04 20 3B C2
8728: 84 A9 0D 20 3B 84 A9 04 CA
8730: A2 10 20 3B 84 CA D0 FA 38
8738: A9 0D 20 3B 84 A9 04 A2 8C
8740: 11 20 3B 84 CA D0 FA A9 C8
8748: 0D 20 3B 84 A9 04 20 3B 6E
8750: 84 A9 07 20 3B 84 A9 03 31
8758: 20 3B 84 EE 0A 80 A9 03 6E
8760: 20 3B 84 A9 13 8D 0A 80 DC
8768: A9 03 20 3B 84 A9 25 8D 67
8770: 0A 80 A9 03 20 3B 84 EE EF
8778: 0A 80 A9 03 20 3B 84 A9 B2
8780: 0A 20 3B 84 A9 0D 20 3B 49
8788: 84 A9 05 20 3B 84 A9 04 2A
8790: A2 10 20 3B 84 CA D0 FA 98
8798: A9 0C 20 3B 84 A9 04 A2 AC
87A0: 11 20 3B 84 CA D0 FA A9 29
87A8: 05 20 3B 84 A9 0D 20 3B EE
87B0: 84 A9 0B 20 3B 84 A0 10 0D
87B8: A9 16 20 3B 84 A9 03 20 CA
87C0: 3B 84 A9 17 20 3B 84 A9 D5
87C8: 25 8D 0A 80 A9 16 20 3B 38
87D0: 84 A9 03 20 3B 84 A9 17 45
87D8: 20 3B 84 88 D0 DA A9 09 2E
87E0: 20 3B 84 A9 0C 20 3B 84 D5
87E8: A9 0C 20 3B 84 A9 04 A2 FC
87F0: 22 20 3B 84 CA D0 FA A9 02
87F8: 0C 20 3B 84 A9 0C 20 3B BE
8800: 84 A9 08 20 3B 84 A9 01 01
8808: 8D 0A 80 A9 01 8D 09 80 DD
8810: A9 0F 20 3B 84 A9 26 8D 16
8818: 0A 80 AD 59 8F 20 3B 84 91
8820: A9 05 8D 0A 80 A9 01 8D D3
8828: 09 80 A2 00 BD 96 80 C9 45
8830: FF F0 07 20 3B 84 EB 4C 6A
8838: 2C 88 A9 15 8D 0A 80 A9 47
8840: 01 8D 09 80 A2 00 BD 4D 3C
8848: 80 C9 FF F0 07 20 3B 84 CE
8850: EB 4C 46 88 A9 01 8D 0A B0
8858: 80 A9 03 8D 09 80 8D 11 C3
8860: 80 A9 02 20 3B 84 A9 26 C3
8868: 8D 0A 80 A9 12 8D 09 80 C6
8870: 8D 13 80 A9 02 20 3B 84 43
8878: A9 FF 8D 12 80 A9 00 8D 69
8880: 0A 80 A9 00 8D 09 80 60 DD
8888: 20 54 85 20 C2 84 D0 D2 0E
8890: C5 D3 D3 A0 D2 C5 D4 D5 2B
8898: D2 CE A0 D4 CF A0 C3 CF 80

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88A0: CE D4 C9 CE D5 C5 BA 00 AF
88A8: 20 9F 85 20 54 85 60 20 FD
88B0: 92 85 20 0D 85 20 C5 85 FE
88B8: A9 00 20 2E 85 A9 00 8D E5
88C0: 15 80 8D 0F 80 8D 10 80 F9
88C8: 8D 0C 80 8D 0D 80 8D 0E 20
88D0: 80 A9 01 8D 16 80 A9 13 9E
88D8: 8D 0A 80 A9 12 8D 09 80 37
88E0: A9 0F 20 3B 84 A9 13 8D C0
88E8: 0B 80 AE 15 80 20 F3 88 BB
88F0: 4C 71 89 BD 95 8F 8D 14 AB
88F8: 80 BD 59 8F 8D 17 80 BD 65
8900: 77 8F 8D 18 80 A9 00 8D 1E
8908: AF 8C 8A 0A A8 B9 B3 8F 2B
8910: 85 FA B9 B4 8F 85 FB A0 52
8918: 00 B1 FA 99 5D 91 C8 CC 20
8920: 14 80 D0 F5 98 18 65 FA C1
8928: 85 FA 90 02 E6 FB A0 00 57
8930: B1 FA 99 5D 92 C8 CC 14 49
8938: 80 D0 F5 98 18 65 FA 85 D9
8940: FA 90 02 E6 FB A0 00 B1 B7
8948: FA 99 5D 93 C8 CC 14 80 46
8950: D0 F5 60 A2 00 BD 5D 91 C2
8958: 8D 0A 80 BD 5D 92 8D 09 F9
8960: 80 AD 17 80 20 3B 84 20 21
8968: 46 8E E8 EC 14 80 D0 E5 58
8970: 60 20 53 89 20 54 85 20 3C
8978: F6 8E AD 1C 80 30 29 20 59
8980: C2 84 A0 A0 A0 A0 A0 CA C7
8988: A0 BD A0 CC C5 C6 D4 A0 CF
8990: A0 CB A0 BD A0 D2 C9 C7 82
8998: C8 D4 A0 A0 C6 A0 BD A0 38
89A0: C6 C9 D2 C5 00 4C ED 89 D6
89A8: 20 C2 84 A0 A0 A0 A0 D5 B5
89B0: D3 C5 A0 CA CF D9 D3 D4 42
89B8: C9 C3 CB A0 D4 CF A0 CD 1A
89C0: CF D6 C5 A0 CC C5 C6 D4 14
89C8: AF D2 C9 C7 C8 D4 FE A0 56
89D0: A0 A0 A0 A0 A0 A0 A0 E3
89D8: D0 D2 C5 D3 D3 A0 C2 D5 7B
89E0: D4 D4 CF CE A0 D4 CF A0 13
89E8: C6 C9 D2 C5 00 20 78 8C 86
89F0: A9 00 8D 1A 80 8D 18 80 1D
89F8: AD 00 C0 C9 A0 F0 F9 4C A0
8A00: 00 00 AD 00 C0 30 12 EE A4
8A08: 1A 80 D0 F6 EE 1B 80 AD 66
8A10: 1B 80 C9 02 D0 EC 4C ED EC
8A18: 89 48 A9 00 8D 10 C0 68 CF
8A20: C9 CA F0 17 C9 CA F0 13 CA
8A28: C9 CB F0 15 C9 CB F0 11 F4
8A30: C9 C6 F0 13 C9 C6 F0 0F 85
8A38: 4C F8 89 20 8D 8A 4C F8 0D
8A40: 89 20 C2 8A 4C F8 89 20 9C
8A48: 7E 8B 4C F8 89 AD 61 C0 1F
8A50: 10 03 20 7E 8B 20 71 8A 64
8A58: A2 00 20 1E FB C0 37 B0 A6
8A60: 06 20 8D 8A 4C 4D 8A C0 48
8A68: C8 90 E2 20 C2 8A 4C 4D 8A
8A70: 8A A0 02 A2 FF CA EA D0 2F
8A78: FC 88 D0 F9 EE 1A 80 EE B7
8A80: 1A 80 AD 1A 80 C9 03 90 DB
8A88: 03 20 ED 89 60 AD 1C 80 EF
8A90: F0 06 CE 19 80 F0 01 60 35
8A98: A9 06 8D 19 80 AD 0B 80 98
8AA0: C9 03 F0 1B 8D 0A 80 A9 6A
8AA8: 12 8D 09 80 A9 00 20 3B 1C
8AB0: 84 CE 0B 80 AD 0B 80 8D 4D
8AB8: 0A 80 A9 0F 20 3B 84 4C 5C
8AC0: 71 8A AD 1C 80 F0 06 CE 4B
8AC8: 19 80 F0 01 60 A9 06 8D FB

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8AD0: 19 80 AD 0B 80 C9 24 F0 5D
 8AD8: 15 8D 0A 80 A9 12 8D 09 DE
 8AE0: 80 A9 00 20 3B 84 A9 0F F0
 8AE8: 20 3B 84 EE 0B 80 4C 71 C0
 8AF0: 8A BD 5D 92 8D 09 80 BD DE
 8AF8: 5D 91 8D 0A 80 A9 00 20 3E
 8B00: 3B 84 FE 5D 92 BD 5D 92 64
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 8B10: 0A 80 AD 17 80 20 3B 84 F2
 8B18: 20 21 8B 60 68 68 4C 27 A3
 8B20: 8F BD 5D 93 F0 06 A9 00 46
 8B28: 9D 5D 93 60 A9 FF 9D 5D C3
 8B30: 93 60 BD 5D 91 C9 24 D0 83
 8B38: 04 20 F1 8A 60 8D 0A 80 0E
 8B40: BD 5D 92 8D 09 80 A9 00 56
 8B48: 20 3B 84 AD 17 80 20 3B DF
 8B50: 84 FE 5D 91 60 BD 5D 91 74
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 8B60: 8D 0A 80 BD 5D 92 8D 09 06
 8B68: 80 A9 00 20 3B 84 DE 5D 33
 8B70: 91 BD 5D 91 8D 0A 80 AD C7
 8B78: 17 80 20 3B 84 60 AD 0F 03
 8B80: 80 F0 08 AD 10 80 F0 03 57
 8B88: 4C AF 8B AD 0B 80 8D 0F 82
 8B90: 80 A9 11 8D 10 80 AD 0F 3A
 8B98: 80 BD 0A 80 AD 10 80 8D D8
 8BA0: 09 80 A9 0E 20 3B 84 20 89
 8BA8: DC 8D 90 03 20 B0 8B 60 0F
 8BB0: A9 00 8D 0F 80 8D 10 80 1A
 8BB8: 20 27 8C AD 14 80 C9 02 4E
 8BC0: B0 06 20 0A 8C 4C 64 8E 43
 8BC8: BD 5D 91 8D 0A 80 BD 5D 4C
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 8BD8: 84 E8 EC 14 80 90 08 CA 6C
 8BE0: CE 14 80 20 0A 8C 60 CA 84
 8BE8: 8A A8 C8 B9 5D 91 99 5C E4
 8BF0: 91 B9 5D 92 99 5C 92 B9 31
 8BF8: 5D 93 99 5C 93 C8 CC 14 0A
 8C00: 80 D0 E8 CE 14 80 20 0A 84
 8C08: 8C 60 A9 01 8D 03 80 A9 E7
 8C10: 01 8D 04 80 A9 64 8D 05 94
 8C18: 80 20 0C 8E EE 05 80 AD 1E
 8C20: 05 80 C9 78 D0 F3 60 F8 AC
 8C28: AD 0E 80 1B 69 25 8D 0E 36
 8C30: 80 90 14 AD 0D 80 1B 69 0F
 8C38: 01 8D 0D 80 90 09 AD 0C EE
 8C40: 80 1B 69 01 8D 0C 80 D8 53
 8C48: 20 4C 8C 60 A0 00 A9 0B 7F
 8C50: 8D 0A 80 A9 01 8D 09 80 2E
 8C58: B9 0C 80 4A 4A 4A 1B 2E
 8C60: 69 1B 20 3B 84 B9 0C 80 8F
 8C68: 29 0F 1B 69 1B 20 3B 84 AF
 8C70: C8 C0 03 D0 E3 60 01 01 2F
 8C78: 20 3A 8D CE 76 8C F0 0E A4
 8C80: CE 77 8C D0 08 A9 03 8D F7
 8C88: 77 8C 20 F3 8C 60 AD 1B 1D
 8C90: 80 8D 76 8C 20 B0 8C 20 E1
 8C98: C3 8C A9 03 8D 04 80 A9 43
 8CA0: 01 8D 03 80 A9 03 8D 05 7F
 8CA8: 80 20 0C 8E 4C 80 8C 00 F1
 8CB0: AD AF 8C F0 07 CE 17 80 4F
 8CB8: CE AF 8C 60 EE 17 80 EE 80
 8CC0: AF 8C 60 A9 26 8D 0A 80 77
 8CC8: A9 01 8D 09 80 AD 17 80 A2
 8CD0: 20 3B 84 A2 00 BD 5D 93 C8
 8CD8: F0 06 20 32 8B 4C E3 8C F4
 8CE0: 20 55 8B 20 DC 8D 90 04 15
 8CE8: 20 B0 8B CA E8 EC 14 80 FF
 8CF0: 90 E3 60 AD 0F 80 D0 05 53
 8CF8: AD 10 80 F0 32 AD 10 80 F4

8D00: 8D 09 80 AD 0F 80 8D 0A AE
 8D08: 80 A9 00 20 3B 84 AC 10 25
 8D10: 80 8B C0 02 F0 1A 8C 10 DE
 8D18: 80 8C 09 80 AD 0F 80 8D F7
 8D20: 0A 80 A9 0E 20 3B 84 20 8D
 8D28: F0 8D 90 03 20 B0 8B 60 9C
 8D30: A0 00 8C 0F 80 8C 10 80 F4
 8D38: 60 12 CE 39 8D F0 01 60 08
 8D40: A9 12 8D 39 8D AD 12 80 C1
 8D48: F0 30 AD 11 80 C9 12 D0 CE
 8D50: 16 EE 12 80 8D 09 80 A9 B7
 8D58: 01 8D 0A 80 A9 03 20 3B 75
 8D60: 84 CE 11 80 4C A7 8D 8D 45
 8D68: 09 80 A9 01 8D 0A 80 A9 AC
 8D70: 03 20 3B 84 EE 11 80 4C CD
 8D78: A7 8D AD 11 80 C9 03 D0 93
 8D80: 16 CE 12 80 8D 09 80 A9 DF
 8D88: 01 8D 0A 80 A9 03 20 3B A5
 8D90: 84 EE 11 80 4C A7 8D 8D 7D
 8D98: 09 80 A9 01 8D 0A 80 A9 DC
 8DA0: 03 20 3B 84 CE 11 80 AD 5E
 8DA8: 13 80 8D 09 80 A9 26 8D 34
 8DB0: 0A 80 A9 03 20 3B 84 3B 85
 8DB8: A9 15 ED 11 80 8D 13 80 9D
 8DC0: 8D 09 80 CE 0A 80 A9 02 89
 8DC8: 20 3B 84 A9 01 8D 0A 80 C0
 8DD0: AD 11 80 8D 09 80 A9 02 8F
 8DD8: 20 3B 84 60 BD 5D 91 CD BD
 8DE0: 0F 80 D0 0A BD 5D 92 CD B4
 8DE8: 10 80 D0 02 3B 60 1B 60 3A
 8DF0: A2 00 BD 5D 91 CD 0F 80 4D
 8DF8: D0 0A BD 5D 92 CD 10 80 F8
 8E00: D0 02 3B 60 E8 EC 14 80 B6
 8E08: D0 E8 1B 60 AD 04 80 85 D4
 8E10: FB 85 FF AD 03 80 85 FC 89
 8E18: AD 05 80 85 FA 85 FD 85 25
 8E20: FE 8D 30 C0 C6 FE D0 05 0B
 8E28: A5 FA 4C 1F 8E C6 FD D0 AE
 8E30: F3 8D 30 C0 A5 FA 85 FD DE
 8E38: C6 FB D0 E8 A5 FF 85 FB 94
 8E40: C6 FC D0 E0 60 00 8E 45 8D
 8E48: 8E A9 01 8D 03 80 A9 7B F5
 8E50: 8D 04 80 A2 08 8E 05 80 74
 8E58: 20 0C 8E CA E0 01 D0 F5 A9
 8E60: AE 45 8E 60 20 54 85 A9 05
 8E68: 00 20 2E 85 F8 AD 16 80 D6
 8E70: 1B 69 01 8D 16 80 D8 AC FD
 8E78: 15 80 C8 CC 5B 8F D0 03 CB
 8E80: 4C 91 8E EE 15 80 A9 00 E6
 8E88: 8D 0F 80 8D 10 80 4C D6 0B
 8E90: 8B 20 C2 84 A0 A0 A0 D9 3D
 8E98: CF D5 A0 C8 C1 D6 C5 A0 49
 8EA0: C5 CC C9 CD C9 CE C1 D4 CB
 8EA8: C5 C4 A0 C1 CC CC A0 D4 B9
 8EB0: C8 C5 A0 C5 CE C5 CD C9 07
 8EB8: C5 D3 FE C9 CE A0 D4 C8 95
 8EC0: C5 A0 C7 C1 CC C1 D8 D9 F6
 8EC8: A1 A0 AD AD A0 00 20 C2 77
 8ED0: 84 D0 D2 C5 D3 D3 A0 BC 07
 8ED8: D2 C5 D4 D5 D2 CE BE A0 B8
 8EE0: D4 CF A0 C3 CF CE D4 C9 D9
 8EE8: CE D5 C5 BA 00 20 9F 85 8C
 8EF0: 20 54 85 4C AF 8B 20 54 DC
 8EF8: 85 20 02 85 20 C2 84 A0 2F
 8F00: A0 A0 A0 A0 A0 A0 A0 1F
 8F08: A0 A0 C5 CE D4 C5 D2 C9 72
 8F10: CE C7 A0 D0 C8 C1 D3 C5 64
 8F18: A0 00 AD 16 80 20 DA FD D6
 8F20: 20 02 85 20 54 85 60 20 1C
 8F28: 54 85 20 C2 84 A0 A0 D9 C4

8F30: CF D5 A0 C8 C1 D6 C5 A0 E2
 8F38: CC CF D3 D4 A0 C3 CF CE FB
 8F40: D4 D2 CF CC A0 CF C6 A0 B7
 8F48: D4 C8 C5 A0 C7 C1 CC C1 67
 8F50: D8 D9 AE FE 00 4C CE 8E 75
 8F58: 1E 10 12 14 44 46 48 4A 24
 8F60: 4C 4E 50 52 54 56 58 5A 6F
 8F68: 10 12 14 44 46 48 4A 4C 0F
 8F70: 4E 50 52 54 56 58 5A 10 33
 8F78: 10 10 10 10 09 09 09 09 2E
 8F80: 08 08 08 07 07 07 07 07 80
 8F88: 07 06 06 06 06 05 05 05 21
 8F90: 05 04 04 04 03 22 36 22 23
 8F98: 22 36 22 22 36 22 22 36 71
 8FA0: 22 22 36 22 22 36 22 22 92
 8FAB: 36 22 22 36 22 22 36 22 3B
 8FB0: 22 36 22 EF 8F 55 90 F7 9C
 8FB8: 90 EF 8F 55 90 F7 90 EF D8
 8FC0: 8F 55 90 F7 90 EF 8F 55 47
 8FC8: 90 F7 90 EF 8F 55 90 F7 2A
 8FD0: 90 EF 8F 55 90 F7 90 EF F0
 8FD8: 8F 55 90 F7 90 EF 8F 55 5F
 8FE0: 90 F7 90 EF 8F 55 90 F7 42
 8FE8: 90 EF 8F 55 90 F7 90 12 2B
 8FF0: 14 04 06 08 0A 0C 10 17 14
 8FF8: 1B 1D 1F 21 23 06 0C 0E 3A
 9000: 19 1B 21 0A 1D 08 0C 0E 68
 9008: 13 14 19 1B 1F 06 11 16 D5
 9010: 21 03 03 04 04 04 04 04 5F
 9018: 04 04 04 04 04 04 04 06 3B
 9020: 06 06 06 06 06 07 07 08 49
 9028: 08 08 08 08 08 08 08 09 4A
 9030: 09 09 09 09 FF 00 00 00 39
 9038: 00 00 00 FF FF FF FF FF 59
 9040: FF FF FF FF 00 00 00 FF 61
 9048: 00 00 FF FF 00 FF 00 00 69
 9050: FF FF 00 FF 00 03 07 0B 96
 9058: 0F 13 17 1B 1F 23 05 09 F2
 9060: 0D 11 15 19 1D 21 03 07 FA
 9068: 0B 0F 13 17 1B 1F 23 03 45
 9070: 07 0B 0F 13 17 1B 1F 23 71
 9078: 05 09 0D 11 15 19 1D 21 79
 9080: 03 07 0B 0F 13 17 1B 1F 81
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 9098: 04 04 04 04 05 05 05 05 C8
 90A0: 05 05 05 05 05 08 08 08 D6
 90A8: 08 08 08 08 08 08 0A 0A CF
 90B0: 0A 0A 0A 0A 0A 0A 0C 0C D7
 90B8: 0C 0C 0C 0C 0C 0C 0C 0E DB
 90C0: 0E FF FF FF FF FF FF FF EB
 90C8: FF FF 00 00 00 00 00 00 E9
 90D0: 00 00 FF FF FF FF FF FF F1
 90D8: FF FF FF 00 00 00 00 00 F9
 90E0: 00 00 00 00 FF FF FF FF 02
 90E8: FF FF FF FF 00 00 00 00 0A
 90F0: 00 00 00 00 00 00 FF 03 15
 90F8: 07 0B 0F 13 17 1B 1F 23 F9
 9100: 05 09 0D 11 15 19 1D 21 03
 9108: 03 07 0B 0F 13 17 1B 1F 0B
 9110: 23 05 09 0D 11 15 19 1D 24
 9118: 21 04 04 04 04 04 04 04 C9
 9120: 04 04 05 05 05 05 05 05 B2
 9128: 05 05 06 06 06 06 06 06 8A
 9130: 06 06 06 07 07 07 07 07 72
 9138: 07 07 07 FF FF FF FF FF 81
 9140: FF FF FF FF 00 00 00 00 63
 9148: 00 00 00 00 FF FF FF FF 6B
 9150: FF FF FF FF FF 00 00 00 73
 9158: 00 00 00 00 00 FF 00 00 7B

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NoZap

The Automatic Program Saver

Elwood J. C. Kureth

This short, useful disk routine automatically saves updated versions of the BASIC program you're working on. The program runs on the Apple IIe, IIc, and IIgs computers. Requires DOS 3.3.

If your computer has ever been zapped by a power dropout or a loose power plug while you were working on an important program, you know how it feels. The cost is high: Your time and your work are gone. It's easy to say *always make periodic backup copies as you type in or write programs*. But when the ideas are flowing, it's also easy to forget or procrastinate. "NoZap" does more than remind you—it does the save for you, periodically and automatically.

NoZap is not a surge protector (it won't protect your computer from hardware damage resulting from a power spike). But it will protect you from momentary electric dropouts, loose connections, and program crashes that can cost you time and effort. NoZap saves the current version of your program every time you enter ten new program lines (this number can be changed). You don't have to do anything you don't normally do—the operation is totally transparent. Every time you press Return for the tenth time, NoZap automatically saves your program to disk.

Typing It In

NoZap is short—only 591 bytes long—so it shouldn't take you too long to type in. Because NoZap is written in machine language, you must enter it using "Apple MLX," the machine language entry program found elsewhere in this issue. Enter the following values when MLX prompts you:

STARTING ADDRESS? 9000
ENDING ADDRESS? 924F

When you're finished typing in the program, save it to disk as NOZAP.

Program Insurance

To use NoZap, boot your computer with DOS 3.3, insert the disk that contains the NoZap file, and enter **BRUN NOZAP**. At this point, you're asked for a program name. This is the filename that will be used to automatically save your program.

The next prompt asks how many lines must be entered before the program is saved. The default value is 10. This means that after every ten lines entered, your BASIC program will be saved to disk. To accept the default value, just hit Return. Otherwise, enter the desired value (no greater than 99) and press Return. (You don't have to hit the Return key when entering two-digit numbers.) An inverse backslash (/) separates the default value of 10 from your entry. NoZap will use the twos complement of a negative number (entering

—1 means your program will be saved after 255 entered lines).

Next, you choose the drive and slot number of the disk to which you want the program saved. The defaults for these two prompts are drive 1, slot 6. Again, you may press Return to accept these values, or you may enter new ones.

If you make a mistake, the program gives you the option to reenter the information. To do so, press Control-O—NoZap will rerun itself. If what you have entered is acceptable, simply press Return and you are dropped back into BASIC.

From now on, simply program as you normally would. NoZap is in charge of your program saves, although you may continue to use the normal SAVE command if you wish.

NoZap can be a lifesaver. It can take the worry out of losing files unexpectedly and let you concentrate on programming.

Forced Saves

Every time you press Return, NoZap counts that as an entered line—even if you didn't enter anything. You can use this program function to your advantage. Say, for instance, you have just added a vital line to your program, but NoZap has not saved it. To *force* NoZap into saving your program, just continue to press Return until the program is saved, or enter the save command yourself.

Sometimes it's best to save a program just before you run it: Who knows what affect an added POKE, USR(), or CALL command might have? And you should always save a program after you've finished typing it in.

When you wish to start something new, it's very important that you disable NoZap. If you don't, NoZap will continue to save the current BASIC program using the previous filename. To disable NoZap, press Control-Reset. To reactivate NoZap, enter **CALL 36864**. This CALL also allows you to change any of the program's options, such as the filename and drive number.

How It Works

There are two pairs of zero-page memory locations on the Apple called *I/O links*. Located at 56-57 (\$38-\$39) and 54-55 (\$36-\$37), these memory locations hold the addresses of the computer's input and output routines, respectively. When sending output to the screen, for example, the computer jumps to the address stored in locations \$36-\$37.

When you boot your computer, DOS 3.3 reads the current I/O links and replaces them with the addresses of DOS's keyboard intercept (input) and video intercept (output) routines. Now when any I/O is performed, DOS's intercept routines are called. When DOS is finished, it passes control to the original I/O routines.

These intercept routines are the key to making NoZap work. You see, when DOS removes the original I/O links, it stores them in fixed locations. NoZap goes in and puts its

own address into these locations, intercepting the intercept routines (pretty sneaky, huh?). And like DOS, when NoZap is finished, it jumps to the original I/O routines.

Every time BASIC's prompt character (]) is sent to the screen, NoZap counts it as an entered line. When the specified number of lines have been entered, NoZap stores the text string *SAVEfilename* into the computer's GETLIN buffer at 512 (\$200) and executes DOS's command parser.



On Disk Only

For those of you interested in the detailed inner workings of this program, we've provided the fully documented source code for "NoZap" on this issue's *COMPUTE!'s Apple Applications Disk*. This source file is saved as NOZAP.S and was compiled using the *Merlin* assembler from Roger Wagner.

Look for the "On Disk Only" box in all of *Apple Applications'* articles. If a program or article can be enhanced by additional disk files, we'll explain them here and provide them on disk. For more information on ordering *COMPUTE!'s Apple Applications Disk*, see page 29.

NoZap

For mistake-proof entry, use "Apple MLX," found elsewhere in this issue, to type in this program.

```
9000: A9 00 85 4C A9 90 85 4D 53
9008: A2 00 BD 29 90 9D 00 95 55
9010: E0 68 F0 7E E8 4C 0A 90 DE
9018: B9 00 95 F0 07 20 ED FD 6A
9020: C8 4C 18 90 C8 BC 71 95 B5
9028: 60 D0 D2 CF C7 D2 C1 CD DF
9030: A0 CE C1 CD C5 BA 00 CE 52
9038: D5 CD C2 C5 D2 A0 CF C6 EB
9040: A0 CC C9 CE C5 D3 A0 D4 9E
9048: CF A0 C2 C5 A0 D3 C1 D6 DC
9050: C5 C4 BA 00 D3 C1 D6 C5 F5
9058: A0 D4 CF A0 C4 C9 D3 CB C3
9060: A0 C4 D2 C9 D6 C5 A0 A3 AC
9068: BA 00 D3 CC CF D4 A0 A3 E4
9070: BA 00 D5 D3 C5 A0 3C 43 53
9078: 54 52 4C 3E 2D 4F A0 D4 82
9080: CF A0 C3 C8 C1 CE C7 C5 55
9088: A0 CF D0 D4 C9 CF CE D3 54
9090: 00 00 20 58 FC A0 00 20 C5
9098: 18 90 20 6F FD AD 00 02 8D
90A0: C9 8D D0 03 4C 92 90 A9 CB
90A8: 00 9D 00 02 A0 00 A2 00 9B
90B0: B9 D6 90 99 76 95 C8 C9 75
90B8: C5 D0 F5 BD 00 02 F0 08 7D
90C0: 99 76 95 E8 C8 4C BB 90 0D
90C8: A9 8D 99 76 95 C8 A9 00 DF
90D0: 99 76 95 4C DA 90 D3 C1 56
90D8: D6 C5 AC 71 95 20 18 90 71
90E0: A9 B1 20 ED FD A9 B0 20 3E
90E8: ED FD 20 0C FD C9 BD D0 48
90F0: 0E 20 ED FD A9 0A BD 73 C2
90F8: 95 8D 74 95 4C 51 91 BD 88
9100: 72 95 A9 5C 20 ED FD AD 1F
9108: 72 95 BD 00 02 20 ED FD E5
9110: 20 0C FD C9 BD D0 11 20 94
9118: ED FD AD 00 02 29 0F BD C7
9120: 73 95 BD 74 95 4C 51 91 6D
9128: 8D 01 02 20 ED FD AD 00 57
9130: 02 29 0F AB A9 00 69 0A 35
9138: 88 D0 FB BD 72 95 AD 01 72
9140: 02 29 0F 6D 72 95 BD 73 DF
9148: 95 BD 74 95 A9 BD 20 ED 33
```

```
9150: FD AC 71 95 20 18 90 A9 51
9158: B1 20 ED FD 20 0C FD C9 F0
9160: 8D D0 0D A9 01 BD 68 AA 74
9168: A9 8D 20 ED FD 4C 88 91 6A
9170: 8D 72 95 A9 5C 20 ED FD 81
9178: AD 72 95 20 ED FD 29 0F 8C
9180: 8D 68 AA A9 8D 20 ED FD 3B
9188: AC 71 95 20 18 90 A9 B6 20
9190: 20 ED FD 20 0C FD C9 BD 7A
9198: D0 0D A9 06 8D 6A AA A9 12
91A0: 8D 20 ED FD 4C BF 91 BD 42
91A8: 72 95 A9 5C 20 ED FD AD C7
91B0: 72 95 20 ED FD 29 0F BD 95
91B8: 6A AA A9 8D 20 ED FD AC 2B
91C0: 71 95 20 18 90 20 0C FD A2
91C8: C9 BF D0 03 4C 92 90 20 EC
91D0: 58 FC A9 00 8D 70 95 BD 7B
91D8: 75 95 A9 01 BD 53 AA A9 1A
91E0: 92 8D 54 AA A9 F1 BD 55 6B
91E8: AA A9 91 BD 56 AA 4C D0 9D
91F0: 03 AD 70 95 C9 DD D0 03 D2
91F8: 4C 07 92 20 BA 9F 4C 1B 60
9200: FD 8D 70 95 4C F0 FD AD BE
9208: 75 95 C9 00 D0 0B A9 01 BD
9210: 8D 75 95 20 BA 9F 4C 1B 16
9218: FD CE 74 95 AD 74 95 C9 0C
9220: 00 D0 11 A9 00 BD 75 95 EC
9228: AD 73 95 BD 74 95 CE 74 98
9230: 95 4C 3A 92 20 BA 9F 4C 1B
9238: 1B FD A2 00 BD 76 95 F0 A2
9240: 07 9D 00 02 E8 4C 3C 92 F3
9248: 4C CD 9F 00 FF FF 00 00 FA
```

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Ticket to Paris

Carol S. Holzberg

Pack your bags and hop aboard your computer for a visit to the Eiffel Tower, the Louvre, cabarets, bistros, and the Moulin Rouge. Learn the difference between Gruyère and Camembert, Gauguin and Matisse, Calais and Nuit St. George, *meunière* and *coq au vin*. Visit Montmartre, the Arc de Triomphe, the Galeries Lafayette. Take a subway ride. Sip wine at an expensive French restaurant or *café au lait* at a *brasserie*. Experience Paris the way Parisians do.

You can almost smell the stale Gitanes-laden air of the metro, or the pleasantly sweet aroma of freshly baked *baguettes*. After experiencing Blue Lion's *Ticket to Paris*, I was ready to call my travel agent and book a seat on the next flight to France.

Parlez-Vous American?

Ticket to Paris does not offer computerized drill and practice in the intricacies of the French language, nor will you be able to speak French fluently by the time you've finished. But if you want the chance to practice your French, familiarize yourself with some of the sites and scenes of Paris, or learn a bit about French culture, geography, food, art, history, and the exchange value of the French franc, then this travel simulation is for you.

The program offers authentic dialogues in either French or English. It provides true-to-life situations that many tourists experience. The program also offers bits and pieces of information that a traveler from the United States may find helpful—for instance, the correlation between Celsius and Fahrenheit, or how to tell a doctor you have a toothache. *Ticket to Paris* also identifies places a visitor to Paris may want to seek out while spending time in the city.

The Missing Cousin

Ticket to Paris is an entertaining adventure in which you must locate your missing cousin. It seems he left for Paris months ago, and now he refuses to return. So you travel to Paris to find him and convince him to fly back to the

United States with you. You only have two weeks, \$600, and 150 francs to accomplish your task.

Along the way, the people you meet will ask you questions, which come in multiple-choice format, so even players with a limited French vocabulary can often make an educated guess. You get three points for every question answered correctly on the first attempt, and one point for questions answered correctly on the second try. Correct answers are rewarded with helpful clues such as "See the painter with the blue style," "Get some French bread," "Go see a doctor," or "Go have some 'coffee with hot milk.'"

After experiencing Blue Lion's Ticket to Paris, I was ready to call my travel agent and book a seat on the next flight to France.

You track down clues by visiting places where you think the objects may be found and where you think your cousin may appear. He'll return to the United States only if you have at least 250 points and five solved clues.

Never Enough Francs

Your mission is fraught with unexpected problems. The first place to visit after you leave the airport is a bank to exchange some money. If you don't have enough francs to pay your expenses, you'll have to pay in dollars. When you pay in dollars, you're overcharged. Remember your limited budget. Also, make sure you eat enough food (24 nutritional points daily) and get sufficient rest. Your body eats one nutritional point per hour. Check into a hotel and say *bonne nuit* (good night) to get your rest—if you don't take care of yourself, you'll end up in the hospital. Hospitals cost you valuable time and money, neither of which should be wasted.

The first time I played *Ticket to Paris*, I ran out of francs early in my adven-



Accept a table at one of Paris' finest restaurants.

tures because the bank had been closed when I tried to exchange my money. In order to conserve the few francs I started with, I opted for a walking tour of the city—rather than take a bus, subway, or taxi—while tracking down the clues. I soon ended up in the hospital because of fatigue. In order to avoid finding myself in the hospital again, I checked into a hotel at 10:00 p.m.

The hotel was expensive, but it was too late in the evening to go somewhere else. After paying my bill the next morning, I had barely any cash left. With hospital bills, exorbitant lodging costs, expensive meals, and no way to wire home for more money, I soon ran out of money and lost the game. I immediately started over again, determined to prove that I could survive and enjoy the perils of Paris.

Play Options

During the game, five icons are displayed at the bottom of the screen: moneybag, body, map, book, and calendar. The moneybag lets you know your financial status; the body icon gives you data about your food and rest needs; the map icon leads you to the map of Paris; and the book icon is a dictionary that will help your French vocabulary.

The book icon can't be accessed while you're having a conversation. You have to complete your dialogue first and then look up the meaning of the word(s) you missed. If you use the dictionary too frequently, it becomes tattered and hard to read. Eventually, you'll have to find the right store to purchase another one. If you choose the

calendar icon, you can access information about points and credit status. Pressing Escape exits the game, and there's a save option, making it possible for you to resume a game where you left off.

*Check into a hotel and say
bonne nuit (good night) to get
your rest—if you don't take
care of yourself, you'll end up
in the hospital.*

Ticket to Paris offers realistic details of French life while improving your French vocabulary, but it's not for people who don't already have some smattering of French. While finding your long-lost cousin will not guarantee language fluency, the program will refresh your memory about all those verbs you conjugated and sentences you translated in your high school and college French classes.

If you do find yourself on a plane to Paris after using this program, you will probably feel a bit more comfortable with the language and culture of the people you meet along the way.

Ticket to Paris
Apple II series with a minimum of
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Decisive Battles of the American Civil War: Volume 1

Bull Run to Chancellorsville

Robert L. Guerra

Although wargame manufacturers have traditionally looked to World War II as a source of battles, over the last year or two, exciting historical simulations based on the battles of Gettysburg, Antietam, Chancellorsville, and Shiloh have proven the American Civil War to be a valuable source for battle scenarios. One of the latest games to focus on the War between the States is SSG's *Decisive Battles of the American Civil War*.

This, the first of two volumes, is appropriately subtitled *Bull Run to Chancellorsville*. Its six scenarios chronicle the first half of the Civil War, beginning with the 1861 Battle of Bull Run and ending with the 1862 clash between the Confederacy and the Army of the Potomac at Chancellorsville. Also included are a second Bull Run scenario and scenarios based on the battles of Antietam, Shiloh, and Fredericksburg.

Before beginning the game, you can make a single copy of the master program disk. The data on the flip side of the disk may be backed up as many times as needed. You can also configure the game for a two-drive system and specify the slot number and dump code for your printer to allow hi-res screen dumps.

Decisive Battles of the American Civil War can be played against a human opponent or the computer. There's even an observe mode in which the computer plays against itself. This mode is useful when getting a sense of how to play the game, or when learning the computer's strategy for the different scenarios.

To even the odds of a one-sided battle, or when two players of unequal skill compete, there's a handicapping option that allows you to give either side a slight, minor, or major advantage. When a handicap is in effect, gameplay is unchanged, but the number of victory points awarded for inflicting casualties or controlling objectives is adjusted.

Mapping the Game

Like SSG's other efforts, *Decisive Battles of the American Civil War* is controlled using an intricate system of four types of menus. To help you find your way through the system, SSG provides menu schematics on convenient 6 x 9 inch cards. Even without the cards, however, the menus' logical design makes them easy to use.

The program provides a large map detailing the game's objectives and terrain. A well-organized user's manual

takes you step-by-step into your first battle and then goes on to explain the functions of each menu. In addition, the manual contains complete orders of battle for both the Union and Confederate forces.

One of the things that makes SSG games so easy to learn is the wealth of onscreen information. As you begin each turn, for example, the screen displays the date, time, and weather conditions on the battlefield. This information is important because it directly affects your troop's ability to spot enemy units. Similarly, when you access the operations menu, you see a summary of your losses, victory points, and the name of your commanding officer and second in command.

*... a Heroic profile could
inspire nearby troops to victory,
but it also increases the
likelihood that you (or at least
your computerized surrogate)
will be wounded or killed in
battle.*

The left part of the screen displays a colorful scrolling hex map that shows the position of each of your brigades, the location of roads, and the type of terrain. Terrain has a major influence upon sighting, movement, and combat.

Before issuing any orders, you have the opportunity to survey the entire map. During such a "map walk," you can temporarily remove all visible units and roads to get a better look at the underlying terrain; or you can have the computer identify every hexagon, according to which side currently controls it.

Battle Strategies

Terrain is just one factor that influences the outcome of battles. Another is the personality profile you select for your computerized commanding officer. The options here are Heroic, Bold, Cautious, or Sensible (the default). When you find your forces in a threatening situation, a Heroic profile could inspire nearby troops to victory, but it also in-

21 JUL 1861
Time 6:00
Turn 14

On Off
GOOD
CLAR
Objective
MORE
CYCLE
UNIT
MORE

30% Cost
Good Cover
Fair Sight

Woods

Finally, as with previous SSG games, *Decisive Battles of the American Civil War* allows you to modify the existing scenarios or design your own from scratch. Included on the program disk is a military construction kit called *Warplan* that lets you design and manipulate all of the forces affecting battle. A second utility, *Warpaint*, creates custom unit symbols and terrain. A 20-page tutorial, complete with blank design forms for terrain, weapons, forces, and objectives, makes it a snap to vary existing scenarios or to create entirely new ones.

Decisive Battles of the American Civil War *allows you to modify the existing scenarios or design your own from scratch.*

Decisive Battles of the American Civil War: Volume 1
Apple II series with a minimum of 64K
Electronic Arts
1820 Gateway Dr.
San Mateo, CA 94404
\$40.00

Gregg Keizer

The *Rand McNally Concise Atlas of Europe*, that's how. I pulled out the slim volume, paged through its maps and past capsule country descriptions until I stumbled upon the tiny nation of Luxembourg. Its fortifications, many of them dating back to the Middle Ages, had given it the moniker I was searching for. I rushed to the airport and grabbed the next plane north.

Where in Europe Is Carmen Sandiego?, third in the phenomenally successful series from Brøderbund, doesn't put you in the middle of a Raymond Chandler novel, but it does make learning geography lots of fun.

*I rushed to the airport and
grabbed the next plane north.*

There are two things you need to do in *Where in Europe Is Carmen Sandiego?*. The first is find the thug or thugette you're after by following him or her from city to city on some Grand Circle tour of the Continent. That's where the atlas becomes so important, for without its facts and figures, as well as its varied maps, you'd have to depend on your own knowledge of geography. The other part of successful Carmen crime-stopping is identifying the suspect. That doesn't come from any geographical clue, but from random messages you get from the Chief. Piecing together facts ranging from hair color to favorite movie, you can eventually obtain a warrant. That's vital, for



without the warrant, the criminal must be freed on lack of evidence when you catch up with him or her.

It's the first part of criminology Carmen-style that makes this game just as much fun as the others in the series. In each city, you're able to uncover evidence and stumble upon clues as to the next stop on the suspect's itinerary. Three methods of finding information are available: Question a witness, search the scene, or call a tipster. No one method works better than the others; each technique offers up a different clue, however. If you're quick on the uptake and figure out where your quarry is heading after just the first clue, you're more likely to catch up with him or her in the next city. Using all three methods slows you down, though, and may give the suspect a chance to make a clean getaway.

Scenes on the screen are acceptable, though not dazzling, representations of the city you're in. A few interesting facts are also displayed, though these rarely have much to do with your search for one of Carmen's gang. Instead, it's best to devote your energies to uncovering the route of your prey.

To help you do that, you have several tools, not the least of which is the Crime Lab. The Lab is part of the program, and is always accessible. Inside the Lab is a small database which lists flag colors, currency names, and languages of the countries of Europe. Another part of the Lab is used to obtain a warrant, a process which requires that you keep up-to-date information in your Notebook.

But the best friend you've got is your atlas. It's full of almost trivial facts that *Where in Europe Is Carmen Sandiego?* loves to test you on. More than 20 pages of maps detail the cities, rivers, and other physical characteristics of ev-

ery European country. "The Gazetteer," a section in the back, is where you'll find information such as which nationality speaks Romansch and what form of government the Netherlands has.

Once you figure out where the gangster has gone, it's a simple matter to go to the airport and check the departing flights. In fact, it's a good idea to visit the airport if you're stumped; there are only a few destinations listed from each city, and you may be able to eliminate several by digging through the atlas.

Warrants Wanted

The other half of your job is to identify the gang member you're chasing. You have little control over this, since you're forced to wait for the Chief to feed you facts. They show on the screen periodically. It's up to you to stick them into your Notebook so that the Lab can issue a warrant when you have enough to go on. Included with the program is a photo of the Chief's blotter, with caricatures of Carmen's gang and some background on each. The blotter photo may be of limited help in filling in some of the blanks.

It's possible to do too well in *Where in Europe Is Carmen Sandiego?*—if you nab the thug, but don't have a warrant, you still lose the case because of insufficient evidence. If you're hot on the trail (you'll have at least one brush with flying missiles or falling safes when you close in) and don't have a warrant yet, it's best you leave town. That way you won't cross paths with your suspect. Unfortunately, it means you'll have to pick up the scent later.

European Vacation

Where in Europe Is Carmen Sandiego? is a seamless and painless way to learn. And the things learned aren't just the raw facts of countries. Learning to use reference materials such as the atlas is required before you'll put a stop to Carmen and her kind. Pouring over the atlas gives everyone—not just school-aged children—practice in problem solving and information gathering.

The program also appeals to those outside the classroom. It works as well in the home as it does in school, and has enough depth to keep parents as interested in the outcome as their children.

Educational software always strives for ways to make learning fun. *Where in Europe Is Carmen Sandiego?* is not only fun to play, but an excellent example of what educational computing can be when everything works.

Where in Europe Is Carmen Sandiego?

Brøderbund
17 Paul Dr.
San Rafael, CA
\$44.95

DB Master Version Five

Vincent D. O'Connor

In the early 1980s, *DB Master* was the database on the Apple II. Eventually, however, the product died. Now it's been revived and reworked into one of the most powerful databases in the Apple II world.

DB Master Version Five provides a powerful database for those who need more features or larger files than *AppleWorks* provides. The program requires an enhanced Apple IIe with extended 80-column card, a IIc, a IIGS, or a Laser 128; and a minimum of two 5¼-inch disk drives. The program automatically installs itself on hard drives and ramdisks of at least 300K.

For the sake of brevity, I'm going to drop the program's version number and refer to it simply as *DB Master*.

DB Master vs AppleWorks

Although there are other databases for the Apple II series, the obvious comparison is with *AppleWorks*, and, quite simply, *DB Master* is far more powerful. It allows up to 200 fields per record as opposed to *AppleWorks'* 30, with up to 250 characters per field compared to *AppleWorks'* 76.

DB Master allows you to set up pages that hold a screenful of information. Up to 30 pages are allowed per record. You can create files up to 10 megabytes in size if you have a hard disk, and floppy disk files can span up to 50 disks. *DB Master* doesn't require you to load the entire file into memory as does *AppleWorks*.

DB Master goes beyond *AppleWorks'* three field types as well. There are 13 different field types, including yes/no fields, dollar/cents fields, three different numeric fields, and user-defined fields in which you can control the type of characters allowed in each position in a field. This is extremely useful for part numbers, social security numbers, phone numbers, and so on. Date fields can be displayed in 11 different formats, and numeric fields can hold formulas up to 75 characters long.

Creating Reports

While much of *DB Master* is impressive, it's the report generator that really stands out. You can create four types of reports: columnar, label, form, and a mail merge. Within these categories you can create almost any type of report imaginable. Each file can have up to 255 master report formats—far more than you're likely to need.

The labels format offers easily created three- and four-across labels with more than 15 lines per label. More impressive is the forms format. With it, you can fill

in or duplicate preprinted forms such as checks, tax forms, invoices, and similar forms that would be difficult or impossible to do with *AppleWorks*.

Ease of Use

DB Master is not the type of program that you learn overnight. It may take several months before you can make use of all of its features. This isn't meant as criticism; you always pay a price for increased power, and part of that price is a steeper learning curve.

DB Master comes with several sample files and a tutorial that takes you step-by-step through creating, editing, and printing files. I found the tutorial easy to follow and very helpful, although it covers only the basics. There's an onscreen help system called the Tutor, which is one of the weakest points of the program. These help screens only offer page number references to the manual's glossary. In my opinion, help screens should eliminate the need for the manual, not require it.

The manual is well written and easy to use. One of the most useful sections is the "Things You Can Do with *DB Master*." It's a quick and easy guide to most of the program's features. The reference section gives detailed information about each menu option, while the glossary provides a dictionary of the words and phrases used in the program.

DB Master converts *AppleWorks* files and *pfs:file* files to *DB Master* format. It also loads database files saved as ProDOS text files, if there are a fixed number of fields per record and each record ends with a carriage return. *DB Master* doesn't convert DIF files, however. You must create a *DB Master* file, then load the text into the *DB Master* file. I created several text files with an Applesoft BASIC program. *DB Master* converted them quickly and without any problems.

Caveats

While *DB Master* works with 128K memory and two 5¼-inch disk drives, I recommend that you have a 300K ramdisk and a 3½-inch drive or a hard drive. The RAM disk eliminates disk swapping, and the extra drive helps out with large data files. An empty 12-field *AppleWorks* file takes about 2K of disk space, while the same *DB Master* file takes about 25K.

DB Master is a powerful program, but it's not for everybody. If you need a database for such things as invoicing, payroll, or inventory control, *DB Master* is for you. If not, stick with *AppleWorks*.

ADD RECORDS File: NEW.INVOICES # of records = 5 page 1 of 3

Invoice Number: _____ Date of Order: _____
 Customer Number: _____ Date Shipped: _____
 Purchase Order #: _____

Sold to: Ship To:

Name: _____ Name: _____
 Addr1: _____ Addr1: _____
 Addr2: _____ Addr2: _____
 City: _____ City: _____
 State: _____ Zip: _____
 Phone #: () _____ * _____

Terms: _____

CTRL: T tutor A Add this record B End mode C Quit (return to Main Menu)
 G Go to page # N Next/Previous page V View last record added X perform rules
 I Insert/overtyp D Delete character B Beginning/End of field Z Zap field contents

This sample data-entry screen is a direct screen dump of the DB Master Version Five program. Notice the options listed at the bottom of the screen.

or a simpler database.

DB Master Version Five
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SuperPrint

Duncan Teague

Have you ever felt constrained by the bounds of an 8½ × 11 inch piece of paper or by the restrictive placement choices of certain printing programs? If so, Scholastic has an alternative: *SuperPrint*. *SuperPrint* is a well-designed printing program that gives you free reign over graphic size and placement.

SuperPrint lets you place clip art on a page in any position and in a variety of sizes. You can superimpose text in several typefaces, sizes, and styles. When you've completed your creation, you can print in either black-and-white or in color (on an Imagewriter II) in seven different sizes.

It's this wide range of sizes that justifies *SuperPrint*'s name. The smallest size available is barely a quarter of a page. The largest size creates 55 × 24 inch "super" posters that are pieced together from 8½ × 11 inch printouts.

What's in the Package?

SuperPrint comes on a set of four double-sided 5¼-inch disks. Two copy-protected program disks are included. Within the first 60 days, you can obtain a free replacement for a defective disk.

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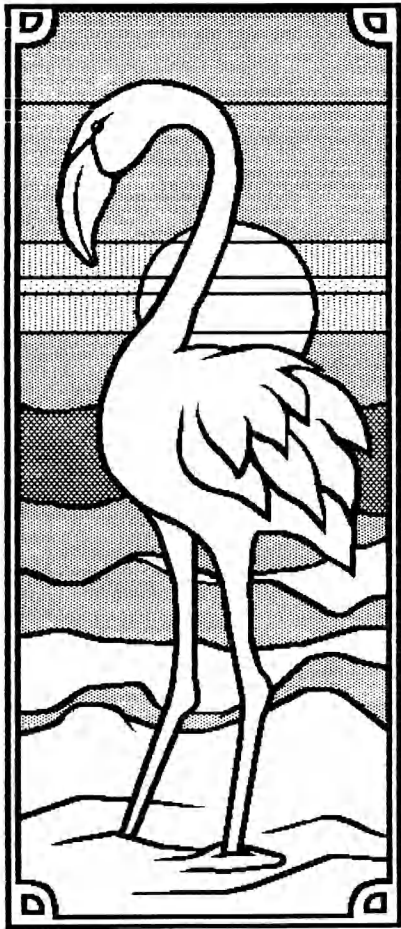
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Here's a reduced version of a standard-sized poster.

For the following ten months, replacement disks cost \$10.

For the same \$10 fee, Apple IIGs users may exchange one 5¼-inch disk for its 3½-inch counterpart. I regard this policy as deplorable. Both disk sizes should be included in the package, with

one backup disk in either size available upon return of the registration card.

ProDOS-formatted work disks are provided on the flip side of each program disk.

The two remaining disks contain over 100 small- and medium-sized clip-art graphics; one tiny and three medium-sized fonts; six frame designs, four stationery headers, and nearly three dozen graphics backgrounds; 15 choices of three-screen tall poster art; and two large typefaces appropriate for banners.

Using SuperPrint

SuperPrint is easy to learn and to use. It does an excellent job of checking for errors, such as missing disks, incorrect disks, unsaved files, duplicate file names, and improper input. The novice will have no trouble creating a document within minutes of turning on the computer.

The appearance and content of the documentation is as unimposing as the program's operation. You'll find separate tutorials for each of the six types of *SuperPrint* documents: posters, signs, cards, banners, borders, and calendars.

Although other graphics printing programs produce signs, cards, calendars, and banners, most limit the number, size, and placement of graphics. They also restrict the size of the output, except for banners, to what will fit on a single 8½ × 11 inch page.

Graphics and Text

SuperPrint allows you to "stamp" clip art onto any position of the document. Using a mouse, you can position artwork with single-pixel accuracy. Keyboard users can move clip art using one of nine increments, the smallest being about two pixels. Pressing the mouse button or the Return key sets the graphic in place.

Using the keyboard or the mouse, you can position the text cursor on the screen, pressing Return to set the cursor in place. Another Return moves the cursor immediately below the first letter of the previous line. As long as the arrow keys (or the mouse) do not alter the text cursor's position, Delete serves as a destructive backspace.

Normal text can be changed to bold or outline, but the effects are not cumulative. In other words, you can't have bold-outlined text; it's just one or the other. Text can be typed adjacent to artwork or superimposed on top of it.

Super-Sized Output

You can print posters and signs in seven formats: miniature, standard, tall, short, skinny, large, and super. The exact dimensions of these sizes aren't listed in *SuperPrint*'s manual, but the following table will give you an idea on how a

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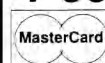
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This sample printout is one of *SuperPrint*'s sign graphics.

graphic increases in size. The uppercase letters *W* and *H* refer to width and height.

Size	Width	Height
Miniature	W*1	H*1
Standard	W*2	H*2
Tall	W*2	H*4
Short	W*2	H*1
Skinny	W*1/2	H*4
Large	W*4	W*4
Super	W*6	H*6

For miniature posters, the height is about 8 inches. Miniature signs are about 5 inches tall. The width is about 3½ inches for both.

A large poster measures about 14 × 32 inches, while a short sign is about 7 × 5 inches. The skinny version of anything looks ludicrous—so narrow as to serve no practical purpose other than to demonstrate the programmer's prowess.

Large posters are printed onto several sheets of fan-fold paper. The complete poster must be taped together. The result looks quite nice, since the graphics have such high-resolution detail. A large poster's final dimensions are 14 × 32 inches, just a bit too tall to be pasted onto a 22 × 28 inch sheet of poster board. Super-sized posters take 15 sheets—three wide by five high. They measure a whopping 21 × 48 inches.

Cards can be printed in only one size.

Banner messages can be up to 32 characters long. The smallest-sized clip art is just right for placing inside the outline of the two large banner fonts. Clip art can be placed anywhere on the banner to add visual interest.

Borders are clip-art products. You can print multiple copies to generate repetitive patterns in three sizes.

SuperPrint's Calendar is a giant creation. By adding a clip-art border, a banner for the name of the month, and a poster or two, you've got a calendar the size of a bulletin board.

SuperPrint supports more than 60 interfaces and 40 printers. The black-and-white print routines take just over two minutes per page. Color printouts take four times as long in black-and-white and over two hours for a super-sized poster.

Uses and Users

My review package contained the aptly named "home" versions of the artwork and fonts. The graphics have a coloring-book appearance, lending themselves to numerous family activities and rainy-day projects. And the program's various options really dress up the printouts and keep them from looking like ordinary computer creations.

Scholastic has several additional Graphics Packs aimed at educators. The subject matter on these disks ranges from science and social studies to holidays and school events. Teachers could, for example, create similarly designed documents in several formats for the same event: super-sized posters to promote a school play, standard-sized sign handouts for students to take home, and miniature border tickets to sell at the door.

SuperPrint
Apple IIe (with 128K), IIc, and IIgs;
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Tips, Tricks, & Tidbits

Each issue, "Tips, Tricks, & Tidbits" serves up a wealth of information on programming and applications software for Apple II and Macintosh personal computers. If you have an interesting (and unique) solution to a programming problem, or a tip or tidbit on almost any popular application program, send it to Apple/Mac Tips, COMPUTE!'s Apple Applications, P.O. Box 5406, Greensboro, NC 27403. We'll pay \$25-\$50 for each tip we publish.

Disk Full. Destroy File?

Whenever you save a file with *AppleWorks*, you have a few seconds to stop the save by pressing Escape. This works because *AppleWorks* saves the file as a temporary file, erases the original file, and then renames the temporary file using the original name. If the disk doesn't have enough room for both files—temporary and original—you get the message *Insufficient room on this disk - is it okay to delete the old copy?* If you answer Yes, the old copy is deleted, and the new copy is saved.

Unfortunately, *AppleWorks* version 2.0 has a bug that destroys database files saved to full disks: If you answer Yes to the *delete the old copy* prompt, the database file saved becomes un-loadable. The moral of this story is: Always answer No to the *delete the old copy* prompt. What you should do instead is go to the Other Activities menu, choose the Delete Files option, delete the old file, and *then* save the current database file to disk.

Vincent O'Connor

ProDOS Can't Tell Time

Here's a hint that I would like to pass along, primarily because of its importance: ProDOS 1.1.1—the version supplied with *AppleWorks* version 1.2 through 2.0—no longer reads Thunderclock cards or clock cards that emulate the Thunderclock.

All files created or changed since the first of the year (January 1, 1988) show a modification date of 1982. The problem has to do with the way ProDOS 1.1.1 determines the year

based on the day of the week when accessing clock cards that don't keep track of the current year. For owners of the IIGS, this isn't very important news, since ProDOS 1.1.1 never did read the IIGS's clock.

This bug is exemplified when you attempt to use *AppleWorks* with a Thunderclock-type card. *AppleWorks* will not let you past its startup-date prompt. The only solution I know of is either to remove the clock card or to get a copy of ProDOS version 1.4 from an Apple dealer. I don't recommend ProDOS version 1.2 or 1.3; both have well-documented bugs that can cause problems if you have two 5¼-inch disk drives.

Vincent O'Connor

AppleWorks Has Character

In the February 1988 issue of *Apple Applications*, one of the items in "Tips, Tricks, & Tidbits" stated that the printer configuration for *AppleWorks* 2.0 no longer supported the Control-@ function that's used to change character sets on the ImageWriter. This is true, but you can replace the Control-@ function with a Return. For example, to switch in the ImageWriter's Italian character set, enter the sequence

Escape Z Control-F Return Escape D Control-A Return

For the American character set, use the sequence

Escape Z Control-G Return

Besides character sets, the Return works in other command sequences, like this one specifying no linefeeds:

Escape Z Space Return

Alessandro De Chiara

Keeping Numbers in Line

The following subroutine aligns numbers in columnar format, inserting commas where necessary. My primary reason for writing this subroutine was to format dollar amounts, although the program could easily be adapted for other uses.

The actual subroutine starts at line 2000. Lines 100-140 show how the subroutine might be used. When run, this program prompts you for a dollar

amount—do not enter the \$ symbol—and prints the formatted result. By entering several varying numbers, you can see how the decimal points line up on the screen. To exit the sample program, press Return without entering a number.

```
100 NS = 10: REM COLUMN WIDTH
110 INPUT "ENTER DOLLAR AMOUNT: ";T$
120 IF T$ = "" THEN END
130 GOSUB 2000: PRINT NR$: PRIN
T
140 GOTO 110
2000 REM ===FORMAT DOLLAR AMOUN
TS===
2010 REM - FIND DECIMAL POINT
2020 IF RIGHT$ (T$,1) = "." THE
N T$ = T$ + "00": GOTO 208
0
2030 FOR J = 1 TO LEN (T$): IF
MID$ (T$,J,1) = "." THEN 2
060
2040 NEXT J:T$ = T$ + ".00"
2050 REM - COUNT DECIMAL PLACES
2060 X = LEN (T$) - J: IF X < 2
THEN T$ = T$ + "0"
2070 IF X > 2 THEN T$ = LEFT$ (
T$, LEN (T$) - X + 2)
2080 NR$ = T$: IF VAL (T$) > 99
9.99 THEN GOSUB 2130
2090 REM - RIGHT JUSTIFY NUMBER
2100 X = LEN (NR$):NS$ = "
"
2110 NR$ = "$" + LEFT$ (NS$,NS
- X) + NR$: RETURN
2120 REM - ADD COMMA
2130 IF VAL (T$) > 9999.99 THEN
2150
2140 NR$ = LEFT$ (T$,1) + "," +
RIGHT$ (T$,6): RETURN
2150 NR$ = LEFT$ (T$,2) + "," +
RIGHT$ (T$,6): RETURN
```

To use this subroutine in your own programs, set the string variable T\$ equal to the number to be formatted, set NS equal to the column width, and GOSUB 2000. If your number is in a numeric variable, the code T\$=STR\$ (numeric variable) will convert it into string format and store the result in T\$.

This subroutine has a couple of limitations. First, it only handles numbers between 0 and 99,999.99. Second, all numbers are truncated to two decimal places—that is, 12.247 is truncated to 12.24.

I haven't seen a routine like this in any manuals or magazines. And although a faster, more concise number-formatting routine may exist, this one works fine for me.

Bernard E. Kirkwood



Reader's Feedback

Do you have a question or problem about hardware or software? Or have you discovered something that could help other Apple II or Macintosh users? If so, we want to hear from you. Write to Apple Feedback, P.O. Box 5406, Greensboro, NC 27403. We regret that we cannot provide personal replies to technical questions.

Monitoring the Situation

I own an Apple IIc with a composite monitor. I recently acquired a Video 7 RGB interface. Do I need an analog or a digital RGB monitor? Who makes RGB monitors that work with the IIc? Do they make these monitors in 14-inch or larger sizes?

Louis Ross
New York, NY

For a IIc with a Video 7 interface, you need a digital RGB monitor. The Apple IIGs, which comes with built-in RGB output, uses analog RGB monitors. Most RGB cards for the Apple IIe and IIc provide digital RGB output, and all Apple II's offer composite output.

Composite output can be displayed on a television with an RF modulator or on a composite monitor. You don't need an RF modulator when using a television with a composite video input port. RGB delivers a clearer picture than composite because it delivers more information than composite.

Bandwidth measures the quantity of information that a monitor receives and translates into a display. The bandwidth of color composite monitors ranges from 4 MHz to 5 MHz. The bandwidth for monochrome composite monitors is about 9 MHz. RGB monitors have the highest bandwidths of all, at 15 MHz or higher.

Analog RGB delivers a better picture than that produced by digital RGB. A digital RGB monitor translates numbers into specific colors. This restricts the number of possible hues and shades. An analog RGB monitor can do subtle shading, creating a wide range of colors. The Apple IIGs with an analog RGB monitor has the best display in the Apple II family.

RGB monitors come in various sizes. Large, 14-inch monitors are available, but cost much more than 12-inch monitors. RGB monitors are manufactured by several companies. Here are the addresses of three such companies:

Magnavox
N.A.P. Consumer Electronics
P.O. Box 14810
Knoxville, TN 37914
(615) 521-4316

Princeton Graphics Systems
601 Ewing St., Building A
Princeton, NJ 08540
(609) 683-1660

Thompson Consumer Products
5731 West Slauson Ave., Suite 111
Culver City, CA 90230
(800) 325-0464

Better Graphics

Please explain double hi-res mode on the Apple IIc. How do you access it from BASIC? Johnny Ow
Kerman, CA

Double hi-res mode is available on the IIc, IIGs, and IIe with an 80-column card. This mode uses auxiliary memory to double the horizontal resolution of the hi-res screen. So you get 560 X 192 monochrome pixels or 140 X 192 color pixels. Applesoft BASIC doesn't support double hi-res mode—you have to use machine language. The reason Apple didn't add double hi-res commands to BASIC was to maintain compatibility with the older Apple computers.

In the October 1987 issue of *COMPUTE!*, we published a BASIC enhancement program entitled "Chrome." This program lets you create double hi-res pictures on the IIc, IIe, and IIGs using BASIC. "Chrome II," which adds even more commands to the original Chrome program, appears in *COMPUTE!*'s November 1987 issue. Chrome II requires that you have a copy of Chrome.

Screen Dumps

I own an Apple IIc with ProDOS and have been looking for a program that dumps the 80-column screen to the printer. Can this be done from BASIC, or do I need to use machine language?

Ned Watson
Omaha, NE

The BASIC program listed below contains a subroutine at line 60000 that prints the Apple's 40- or 80-column screen. First it detects whether the computer screen is in 40- or 80-column mode and then it performs the actual screen dump.

To use this subroutine, place your main program in lines 100-59999 and execute a GOSUB 60000 whenever you want the screen display sent to the printer. Currently, this program catalogs the current disk drive and prints the results.

```
100 REM SCREEN DUMP
110 PRINT : PRINT CHR$(4) "CATALOG"
120 GOSUB 60000
140 END
60000 IF DF = 1 THEN 60040
60010 DF = 1: DIM TS(23), S$(23)
        : TS(0) = 1024
60020 FOR I = 1 TO 7: TS(I) = TS
        (I - 1) + 128: NEXT
60030 FOR I = 8 TO 23: TS(I) = T
        S(I - 8) + 40: NEXT
```

```
60040 D$ = CHR$(4): M = 0
60050 M = PEEK(49176): REM DEL
        ETE THIS LINE FOR THE APP
        LE II PLUS
60060 PRINT : PRINT D$ "PR#1": P
        RINT CHR$(9) "80N"
60070 FOR J = 0 TO 23: FOR I =
        0 TO 39
60080 IF M > 127 THEN POKE 4923
        7, 0: GOSUB 60180: POKE 49
        236, 0
60090 GOSUB 60180
60100 NEXT I
60110 S$(J) = T$: PRINT T$: T$
        = ""
60120 IF M < 128 THEN PRINT
        NEXT J
60140 PRINT D$ "PR#0"
60150 IF M > 127 THEN PRINT D$ "
        PR#3"
60160 HOME : FOR J = 0 TO 23: P
        RINT S$(J);
60170 NEXT : RETURN
60180 T = PEEK(TS(J) + I): IF
        T < 31 THEN T = 32
60190 T$ = T$ + CHR$(T): RETUR
        N
```

This program prints the text screen only. It works on the IIc, IIe, and IIGs with DOS 3.3 or ProDOS. Delete line 60050 if you are using an Apple II+.

Portable Computers

Apple used to produce a flat panel LCD display for the IIc. I travel frequently and would like to take my computer with me. It isn't practical for me to transport my monitor. Could you please tell me if Apple makes a flat panel display or an extremely small monitor that is easy to transport?

Bradly Parker
S.S.M., Ont.

The LCD display that you mention was discontinued within a year because its low-contrast screen was difficult to read. Unfortunately, there are no stand-alone LCD monitors for the IIc being manufactured right now.

You can compromise by using a portable television and an RF modulator instead of a bulky monitor. There are many 5-inch televisions available, but they're almost as big as Apple's 9-inch monochrome monitor. LCD televisions offer another option, but their 3-inch displays are really too small to read.

The IIc was dubbed "portable" when the machine was first introduced in 1984. The system unit weighs a scant 7½ pounds, but add the weight and bulk of the monitor and an extra disk drive, and you have a behemoth to carry.

So there's no one good solution to your problem. Hopefully, some enterprising monitor manufacturer will market a nice, supertwist LCD display for the IIc. Or better yet, maybe Apple will finally introduce a computer that's truly portable.

Assemblers and Compilers

I would like to know if I can save a copy of the object code created by an assembler without using a compiler.

James W. Moore
Vienna, IL

Before we can answer your question, we need to get some terms straight.

At its most basic level, computers understand machine language only. Machine language consists of numbers (or, more accurately, groups of binary digits represented internally as electronic pulses). Each of these numbers are interpreted by the computer's microprocessor as an instruction.

Assembly language consists of groups of letters called labels, operands, and mnemonics. Each mnemonic represents one machine language instruction. An assembler takes assembly language and converts it to machine language. This is a one-to-one translation in which each assembly language instruction becomes one machine language instruction. A file containing assembly language instructions is called a source file. The machine language file produced by an assembler is called an object file.

Compilers translate programs written in high-level languages (such as BASIC or Pascal) into machine language. A single Pascal instruction may compile into dozens of machine language instructions. Some compilers take the extra step of translating high-level statements into assembly language and then, using an assembler, create machine language object code.

Object code on Apples is stored in binary files. Most assemblers and compilers will save object code for you. To save a binary file yourself, you need to know the starting address in memory and the length in bytes of the machine code. From BASIC, you save object code with the BSAVE command. The syntax for BSAVE is BSAVE filename, A start address, L length. For example, to save a machine language file that resides in memory at 768-810 (\$300-\$32A), use the command BSAVE MY.CODE, A 768, L 42.

To execute a previously saved binary file, type BRUN filename.

Laser-Powered Apples

I'm interested in the Laser 128EX computer and hope you can answer a couple of questions. First, I read that the Laser 128EX runs all Apple II programs. Then I heard that it runs most Apple programs. I also heard that the Laser 128EX alters disks so they can't be used on regular Apples.

Pat Kellum
Sutter, CA

The Laser 128 and the newer 128EX are Apple II compatibles made by Video Technology. These computers run most Apple II software. Since there are slight differences within the Apple II family, 100-percent compatibility isn't possible. You can even have problems running programs developed for the IIe or a IIc.

As for the rumor about altering disks, this is not true. A disk formatted on the Laser will work fine on an Apple.

The Laser 128EX features a faster processor and a lower price than you'll find with the IIc or IIe. It's physically a little larger than the IIc and has one expansion slot. This computer lists for \$579 and includes 128K of memory and a built-in disk drive.

First-time buyers may want the security of buying an authentic Apple. Experienced users, or people wanting a second computer system, should seriously consider the Laser 128EX.

The Old Warhorse

I own an Apple II+ and want to know what upgrade options I have. Where can I find an adapter to plug joysticks or paddles into my computer? Also, can I upgrade to a IIgs the way IIe owners can?

David Tome
Utica, NY

As the II+ approaches ten years of age, it remains a popular computer. Thanks to its superior design and versatile expansion slots, the II+ continues to go strong while other computers from that time period are now sitting idle. That's the good news.

The bad news is that with the market dominated by the IIe, IIc, and IIgs, software and hardware for the II+ is getting harder to find. The II+ isn't fully compatible with the rest of the Apple II family. Among other things, it's incompatible with ProDOS and lacks a lowercase character set.

There are several good cards available for the Apple II+: Cards that add more RAM, a clock, speech synthesis, a faster processor, printer output, and modem support. As for joysticks, both Kraft (450 West California Avenue, Vista, California 92083) and Suncom (260 Holbrook Drive, Wheeling, Illinois 60090) make joysticks that work with the II+ as well as with the other Apple II computers.

The II+ and the IIc are not upgradable to a IIgs. The upgrade card is only available for the IIe and costs about \$500.

Upgrading a II+ with cards will never make it fully compatible with Apple's newer computers. An alternative to expanding your II+ system is to sell it and buy a totally new system, such as the Apple IIgs. This option gives you more compatibility and expandability than you'll get from plugging cards into your II+. In the long run, it can also be a lot cheaper.

Incompatible Cursor Keys

Why do the Apple II's cursor keys operate so oddly in BASIC? The up-arrow key doesn't seem to do anything, and while the down-arrow key manages to move the cursor down a line, I get a syntax error when I press Return. When I use these keys within a word processor, they work just fine, as do the cursor keys on other computers. Why are the Apple's cursor keys so different?

Tim Midkiff
Greensboro, NC

The answer may surprise you—compatibility. There have been several models in the Apple II line, and each new generation was largely compatible with the first. The original Apple II was designed at a time when full typewriter keyboards weren't thought to be necessary on a microcomputer (word processors were barely talked about back then). As a result, the Apple II didn't have cursor keys. And while Apple gradually added keys to the computer, Applesoft BASIC remained the same.

Why did Applesoft have to stay the same? Since Apple's BASIC was built into ROM, machine language programmers have always used handy subroutines present in the code. Al-

though relatively few of the "entry points" to these routines were official, programmers hacked their way through the ROMs to see what they could use. Any changes to Applesoft BASIC would have caused many programs to stop working. Apple has always worried about compatibility, so few changes have been made to the Apple ROMs. Thus, Apple's BASIC editor has never gained full access to the cursor keys.

You might have also asked why you can't access the new hi-res modes on the Apple IIgs from within BASIC. The same considerations apply.

Attention "DataFlex" Users

The "DataFlex" program from COMPUTE!'s *Apple Applications* June 1988 issue had an error in one of its listings. The PRINT statement in line 3250 of DF.MAIN contains an unprintable character, causing our listing to be incorrect. The corrected version of line 3250 should read

```
3250 NEXT : INVERSE : PRINT CHR$(127) : NORMAL : NEXT : RETURN
```

Users who typed in DF.MAIN are the only people required to make this change—the program found on the June disk is correct.

aa

Apple Applications Disk

Typing in a long BASIC or machine language program can be a time-consuming task. Even with sophisticated error-checking programs like "Apple Automatic Proof-reader" and "Apple MLX," you still have to spend hours in front of the computer.

That's why we've made available for purchase a disk containing all the programs in this issue. Formatted on one side for DOS 3.3, on the other for ProDOS, the *Apple Applications Disk* costs \$12.95, plus \$2.00 shipping and handling, and can only be purchased through COMPUTE! Publications. See page 29 for details.

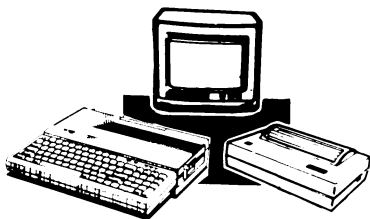
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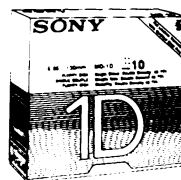
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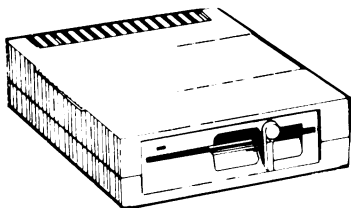
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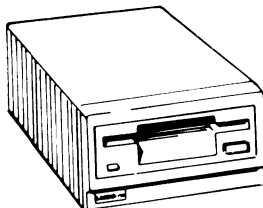
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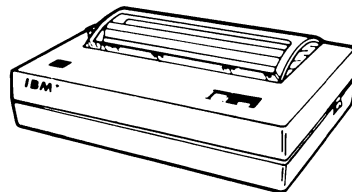
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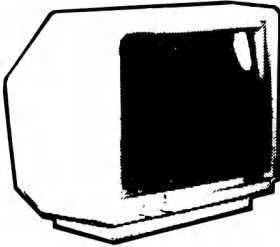
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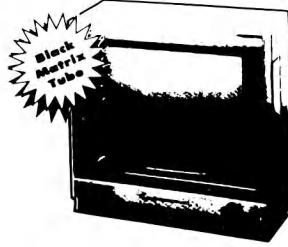
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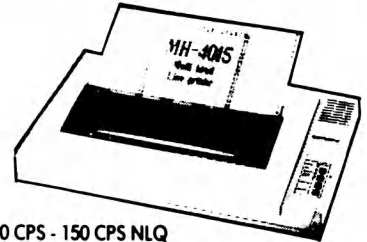
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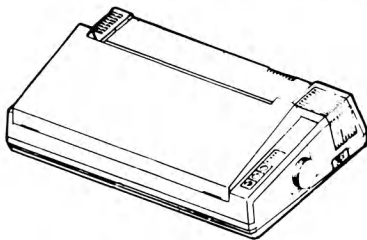
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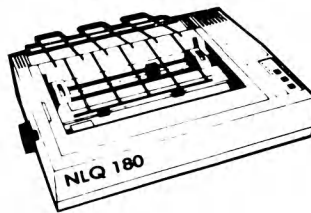
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Apple MLX

Machine Language Entry Program

Tim Victor

"Apple MLX" is a labor-saving utility that allows almost fail-safe entry of machine language programs on the Apple computer. It runs on the II, II+, IIe, and IIC, and IIGS, with either DOS 3.3 or ProDOS.

Note: This is a new version of Apple MLX, with some slight changes. Be sure to use this version to type in all machine language programs in this and future issues of COMPUTE!'s Apple Applications.

A machine language program is usually listed as a long series of numbers. It's hard to keep your place and even harder to avoid making mistakes as you type in the listing, since an incorrect line looks almost the same as a correct one. To reduce the problems associated with typing in machine language programs, we've presented them as MLX listings which can be entered using the "Apple MLX" editor.

MLX checks your typing on a line-by-line basis. It won't let you enter inappropriate characters, and it won't let you continue if there's a mistake in a line or even if you're trying to enter a line or digit out of sequence. You don't have to know anything about machine language to use it. In other words, MLX makes machine language program entry almost foolproof.

Using MLX

Type in and save MLX to disk (you'll want to use it to enter programs in this and future issues of *COMPUTE!'s Apple Applications*, as well as programs in *COMPUTE!* magazine and Apple-specific books from *COMPUTE!* Publications). It doesn't matter whether you type it in on a disk formatted for DOS 3.3 or ProDOS. Programs entered with MLX, however, must be saved to a disk formatted with the same operating system as MLX itself.

If you have an Apple IIe, IIC, or IIGS, make sure that the key marked Caps Lock is in the down position. Type RUN. You'll be asked for the starting and ending addresses of the machine language program. These values are given at the beginning of the machine language program listing and in the program's accompanying article. Find them and type them in.

The next thing you'll see is a menu asking you to select a function. The first is (E)nter Data. If you're just starting to

type in a program, choose this function. Press the E key, and the program asks for the address where you want to begin entering data. Type the first number in the first line of the program listing if you're just starting, or the line number where you left off if you've already typed in part of a program. Hit the Return key and begin entering the data.

Once you're in enter mode, MLX will print the address for each program line for you. You then type in all nine numbers on that line, beginning with the first two-digit number after the colon (:). Each line represents eight bytes and a checksum. When you enter a line and hit Return, MLX recalculates the checksum from the eight bytes and the address. If you enter more than or fewer than nine numbers, or if the checksum doesn't exactly match, MLX erases the line you just entered and prompts you again for the same line.

Invalid Characters Banned

MLX is fairly flexible about how you type in the numbers. You can put extra spaces between numbers or leave the spaces out entirely, compressing a line into 18 keypresses. Be careful not to put a space between two digits in the middle of a number. MLX will read two single-digit numbers instead of one two-digit number (F 6 means F and 6, not F6).

You can't enter an inappropriate character with MLX. Only the numerals 0-9 and the letters A-F can be typed in. If you press any other key (with some exceptions noted below), nothing happens. This safeguards against entering extraneous characters. Even better, MLX checks for transposed characters. If you're supposed to type in A0 and instead enter 0A, MLX will catch your mistake.

MLX also checks to make sure you're typing in the right line. The address (the number to the left of the colon) is part of the checksum recalculation. If you accidentally skip a line and try to enter incorrect values, MLX won't let you continue. Just make sure you enter the correct starting address; if you don't, you won't be able to enter any of the following lines. MLX will stop you.

Editing Features

MLX also includes some editing features. The left- and right-arrow keys allow you to back up and go forward on the line you're entering so that you can retype data. Pressing the Ctrl (Control) key and the D (Delete) key at the same time removes the character under the cursor, shortening the line by one

character. Pressing the Ctrl key and the I (*Insert*) key simultaneously puts a space under the cursor and shifts the rest of the line to the right, making the line one character longer. If the cursor is at the right end of the line, neither Ctrl-D nor Ctrl-I has any effect.

When you've entered the entire listing (up to the ending address that you specified earlier), MLX automatically leaves Enter mode and redisplay the functions menu. If you want to leave Enter mode before then, press the Return key when MLX prompts you with the address of a new line.

Display Data

The second menu choice, (D)isplay Data, examines memory and shows the contents in the same format as the program listing. You can use it to check your work or to see how far you've gotten. When you press the D key, MLX asks you for a starting address. Type in the address of the first line that you want to see and hit Return. MLX displays program lines until you press any key or until it reaches the end of the program.

Save and Load

Other menu selections are provided to let you save programs to disk and load them back into the computer. These are (S)ave File and (L)oad File. MLX asks you for the name of the file which contains the program. The first time you save a machine language program, there won't be a file on the disk containing the program. Whatever name you type in will be the name of a new file that's created.

The message DISK ERROR appears during a SAVE or LOAD if a problem is detected. If you're not sure why a disk error has occurred, check the disk drive. Make sure there's a formatted disk in the drive and that it was formatted by the same operating system that you're using for MLX (ProDOS or DOS 3.3). If you're trying to save a file and see an error message, the disk might be full. Either save the file on another disk or quit MLX (by pressing Q), delete an old file or two, and then run MLX again. Your typing should still be safe in memory. If the error message appears during a load, you may have specified a filename that doesn't exist on the disk.

Quit

The (Q)uit menu option has the obvious effect—it stops MLX and enters BASIC. (Of course, you can also press Ctrl-Reset to get out of MLX.)

The Finished Product

When you've finished typing all the data for a machine language program and have saved your work, you're ready to see the results. The instructions for loading and using the finished product vary from program to program. You'll almost always load and run an MLX-generated program by typing BRUN *filename* (or sometimes just BLOAD).

An Ounce Of Prevention

By the time you finish typing in the data for a long program, you may have several hours invested in the project. Don't take chances—use the "Apple Automatic Proofreader" to enter MLX, and then test your copy *thoroughly* before first using it to enter any significant amount of data. Make sure all the menu options work as they should. Enter fragments of the program starting at several different addresses; then use the Display option to verify that the data has been entered correctly. And be sure to test the Save and Load options several times to insure that you can recall your work from disk. Don't

let a simple typing error in MLX cost you several nights of hard work.

Line 100 of MLX traps all errors to line 610. If MLX is typed in correctly, only disk errors should be encountered. A disk-error message when you're not trying to access the drive—for example, when you first start entering data—indicates a typing error in the MLX program itself. If this occurs, hit Ctrl-Reset to break out of MLX and carefully compare your entry against the printed listing.

Apple MLX: Version 1.1

Be sure to use "Apple Automatic Proofreader," found elsewhere in this issue, to enter the following program.

```

35 100 N = 9: HOME: NORMAL: PRINT CHR$ (17)
      ;"APPLE MLX V1.1": POKE 34,2: ONERR GO
      TO 610
CC 110 VTAB 1: HTAB 20: PRINT "START ADDRESS"
      ;: GOSUB 530: IF A = 0 THEN PRINT CHR$
      (7): GOTO 110
BC 120 S = A
E3 130 VTAB 2: HTAB 20: PRINT "END ADDRESS "
      ;: GOSUB 530: IF S > = A OR A = 0 THEN
      PRINT CHR$ (7): GOTO 130
2F 140 E = A
B5 150 PRINT: PRINT "CHOOSE: (E)NTER DATA";:
      HTAB 22: PRINT "(D)ISPLAY DATA": HTAB
      8: PRINT "(L)OAD FILE (S)AVE FILE (Q
      )UIT": PRINT
AE 160 GET A: FOR I = 1 TO 5: IF A$ < > MID$
      ("EDLSQ",I,1) THEN NEXT: GOTO 160
93 170 ON I GOTO 270,220,180,200: POKE 34,0:
      END
AF 180 INPUT "FILENAME: ";A$: IF A$ < > "" TH
      EN PRINT CHR$ (4);"BLOAD";A$;","A$;S
A1 190 GOTO 150
6D 200 INPUT "FILENAME: ";A$: IF A$ < > "" TH
      EN PRINT CHR$ (4);"BSAVE";A$;","A$;S;","
      L";E - S
92 210 GOTO 150
C2 220 GOSUB 590: IF B = 0 THEN 150
7E 230 FOR B = B TO E STEP 8:L = 4:A = B: GOS
      UB 580: PRINT A$;": ";L = 2
B5 240 FOR F = 0 TO 7:V(F + 1) = PEEK (B + F)
      : NEXT: GOSUB 560:V(9) = C
F2 250 FOR F = 1 TO N:A = V(F): GOSUB 580: PR
      INT A$ " ";: NEXT: PRINT: IF PEEK (49
      152) < 128 THEN NEXT
94 260 POKE 49168,0: GOTO 150
CC 270 GOSUB 590: IF B = 0 THEN 150
48 280 FOR B = B TO E STEP 8
M6 290 HTAB 1:A = B:L = 4: GOSUB 580: PRINT A
      $;": ";: CALL 64668:A$ = "":P = 0: GOS
      UB 330: IF L = 0 THEN 150
F9 300 GOSUB 470: IF F < > N THEN PRINT CHR$
      (7);: GOTO 290
27 310 IF N = 9 THEN GOSUB 560: IF C < > V(9)
      THEN PRINT CHR$ (7);: GOTO 290
72 320 FOR F = 1 TO 8: POKE B + F - 1,V(F): N
      EXT: PRINT: NEXT: GOTO 150
8E 330 IF LEN (A$) = 33 THEN A$ = 0:P = 0: P
      RINT CHR$ (7);
22 340 L = LEN (A$):O$ = A$:O = P:L$ = "": IF
      P > 0 THEN L$ = LEFT$ (A$,P)
E0 350 R$ = "": IF P < L - 1 THEN R$ = RIGHT$
      (A$,L - P - 1)
55 360 HTAB 7: PRINT L$;: FLASH: IF P < L TH
      EN PRINT MID$ (A$,P + 1,1);: NORMAL:
      PRINT R$;
7B 370 PRINT " ";: NORMAL
E6 380 K = PEEK (49152): IF K < 128 THEN 380
C1 390 POKE 49168,0:K = K - 128
5B 400 IF K = 13 THEN HTAB 7: PRINT A$;" ";:
      RETURN
A7 410 IF K = 32 OR K > 47 AND K < 58 OR K >
      64 AND K < 71 THEN A$ = L$ + CHR$ (K)
      + R$:P = P + 1: GOTO 330

```

```

C7 420 I = FRE (0): IF K = 4 THEN A* = L* + R
*
5F 430 IF K = 9 THEN A* = L* + " " + MID* (A*,
,P + 1, 1) + R*
0A 440 IF K = 8 THEN P = P - (P > 0)
93 450 IF K = 21 THEN P = P + (P < L)
9D 460 GOTO 330
37 470 F = 1: D = 0: FOR P = 1 TO LEN (A*): C*
= MID* (A*, P, 1): IF F > N AND C* < > "
" THEN RETURN
8B 480 IF C* < > " " THEN GOSUB 520: V(F) = J
+ 16 * (D = 1) * V(F): D = D + 1
5F 490 IF D > 0 AND C* = " " OR D = 2 THEN D
= 0: F = F + 1
0B 500 NEXT : IF D = 0 THEN F = F - 1
17 510 RETURN
85 520 J = ASC (C*): J = J - 48 - 7 * (J > 64)
: RETURN
AB 530 A = 0: INPUT A*: A* = LEFT* (A*, 4): IF
LEN (A*) = 0 THEN RETURN
6F 540 FOR P = 1 TO LEN (A*): C* = MID* (A*, P,
1): IF C* < "0" OR C* > "9" AND C* < "
A" OR C* > "Z" THEN A = 0: RETURN
2D 550 GOSUB 520: A = A * 16 + J: NEXT : RETUR
N
28 560 C = INT (B / 256): C = B - 256 * C - 25
5 * (C > 127): C = C - 255 * (C > 255)
2D 570 FOR F = 1 TO 8: C = C * 2 - 255 * (C >
127) + V(F): C = C - 255 * (C > 255): N
EXT : RETURN
0A 580 I = FRE (0): A* = "": FOR I = 1 TO L: T
= INT (A / 16): A* = MID* ("0123456789A
BCDEF", A - 16 * T + 1, 1) + A*: A = T: N
EXT : RETURN
IF 590 PRINT "FROM ADDRESS ";: GOSUB 530: IF
S > A OR E < A OR A = 0 THEN B = 0: RE
TURN
0D 600 B = S + 8 * INT ((A - S) / 8): RETURN
86 610 PRINT "DISK ERROR": GOTO 150

```

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Apple Automatic Proofreader

Tim Victor

It's easier than ever to enjoy programs for Apple II-series computers. "Apple Automatic Proofreader," an error-checking program for the Apple II, II+, IIe, and IIC, with either DOS 3.3 or ProDOS, alerts you to almost every typing mistake you might make.

"Apple Automatic Proofreader" will help you type in program listings without typing mistakes. It's a short error-checking program that hides itself in memory and attaches to your Apple's operating system. Each time you press Return to enter a program line, this routine displays a two-digit checksum at the top of your screen. If you've typed the line correctly, the checksum on your screen matches the one in the printed listing—it's that simple. You don't have to use the Proofreader to enter listings, but doing so greatly reduces your chance of making a typo.

Getting Started

First, type in the Apple Automatic Proofreader program following this article. The Proofreader can't check itself before it's done, so you'll have to be extra careful to avoid mistakes.

The Proofreader checks which operating system you're running before it hooks up the checksum routine, so you can type it in with either DOS 3.3 or ProDOS. If you want to use the Proofreader with both operating systems, you won't have to retype it. All you need is a utility to copy a file between disks with different formats, such as the one provided on the ProDOS User's or System Utilities disk.

As soon as you finish typing the Proofreader, save at least two copies. This is very important, because the Proofreader erases the BASIC portion of itself when you run it, leaving only the machine language portion in memory.

Now, type RUN and hit Return. The Proofreader clears the screen, loads the machine language routine, displays the message PROOFREADER ACTIVATED, erases the BASIC portion of itself, and ends. If you type LIST and press Return, you'll see that no BASIC program is in memory. The computer is ready for you to type in a new BASIC program.

Entering Programs

Once the Proofreader is activated, you can begin typing in a BASIC program as usual. Every time you finish typing a line and press Return, the Proofreader displays a two-digit checksum number in the upper-left corner of the screen. Compare this checksum with the two-digit checksum printed next to the corresponding line in the program listing. If the

numbers match, you can be pretty certain the line was typed correctly. Otherwise, check for your mistake and type the line again.

A common mistake when entering BASIC programs on the Apple occurs when you accidentally press a key while holding down the Control key. This adds an invisible control character to the line you are typing. If you don't find it before you run the program, this stray character may cause a SYNTAX ERROR or other mysterious behavior. Fortunately, the Proofreader detects the presence of these invisible control characters and displays a checksum that doesn't match the one in the listing. So it's always a good idea to retype a line if the checksums don't match, even though you might not see any difference in the lines themselves.

The Proofreader ignores space characters, so you can omit spaces between keywords and still see a matching checksum. Spaces are important only between the quotation marks of PRINT statements or string assignments. The only mistake the Proofreader won't catch is if you accidentally type too many spaces or leave some out. For this reason, be extra careful when you're entering text within quotes.

Before running another BASIC program, it's a good idea to turn off the Proofreader by holding down the Control key while pressing the Reset button. The machine language part of the Proofreader is kept in memory starting at address 768 (\$300 hexadecimal). This location is out of BASIC's way, but a lot of other programs use this same place for their machine language subroutines. Disable the Proofreader to avoid conflicts.

How It Works

When the Applesoft BASIC interpreter needs to get a line of input from the keyboard, it calls a machine language routine in the Apple's read-only memory (ROM) called GETLN. GETLN, in turn, calls the operating system to get a single keypress, which it stores in an input buffer. If the Return key was pressed, GETLN ends, leaving one new line for the BASIC interpreter in the input buffer. Otherwise, it repeats the process, asking for another keypress.

The operating system normally gets individual keystrokes from a ROM routine called KEYIN, but the Proofreader changes this. When the Proofreader is installed, the operating system calls the checksum routine instead, and the checksum routine asks KEYIN for a character. If any key other than Return was pressed, the checksum routine just passes it on to the operating system, which gives it to GETLN. But if Return was pressed, the checksum routine examines the contents of GETLN's input buffer, which now contains an entire line of input, to calculate the checksum that it displays at the top of the screen.

A common typing mistake is transposition—typing two successive characters in the wrong order, like *PIRNT* instead of *PRINT*. A checksum program that merely adds the codes of the characters in a line can detect only the presence or absence of a character, not transposition errors. Because the Apple Proofreader uses a sophisticated formula to compute checksums, it alerts you to transposed keystrokes.

The Apple Automatic Proofreader detects almost every possible typing mistake, including transpositions, missing or extra characters, accidental control characters, and incorrect line numbers. Typing *COMPUTE!*'s *Apple Applications Special* programs into your Apple computer has never been easier.

Apple Automatic Proofreader

```

52 10 C = 0: FOR I = 768 TO 768 + 68: READ A:
   C = C + A: POKE I, A: NEXT
80 20 IF C < > 7258 THEN PRINT "ERROR IN PROO
   FREADER DATA STATEMENTS": END
10 30 IF PEEK (198 + 256) < > 76 THEN POKE 56
   , 0: POKE 57, 3: CALL 1002: GOTO 50
70 40 PRINT CHR$ (4): "IN#A0300"
24 50 POKE 34, 0: HOME: POKE 34, 1: VTAB 2: PR
   INT "PROOFREADER INSTALLED"
FE 60 NEW
52 100 DATA 216, 32, 27, 253, 201, 141
10 110 DATA 208, 60, 138, 72, 169, 0
75 120 DATA 72, 189, 255, 1, 201, 160
FA 130 DATA 240, 8, 104, 10, 125, 255
47 140 DATA 1, 105, 0, 72, 202, 208
13 150 DATA 238, 104, 170, 41, 15, 9
AF 160 DATA 48, 201, 58, 144, 2, 233
10 170 DATA 57, 141, 1, 4, 138, 74
9E 180 DATA 74, 74, 74, 41, 15, 9
E5 190 DATA 48, 201, 58, 144, 2, 233
E3 200 DATA 57, 141, 0, 4, 104, 170
AF 210 DATA 169, 141, 96
  
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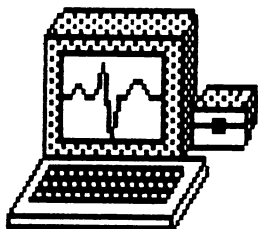
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New Products

Alien Literacy

MindPlay has announced the release of *Ace Explorer*, an educational computer program for the Apple II series of computers.

Designed for students in grades 2-8, this program teaches reading and writing with a science-fiction theme. Players choose from 60 different story missions and learn to read for sequence as they visit alien planets, conduct interviews by video-phone, and search computer banks for information. The information must then be put in sequence before it is inserted into the final report and submitted, along with an alien graphic, to "Mission Control."

Options include sound, time, level, text speed, story selection, story creation, and performance summaries.

The package, which includes a backup disk, retails for \$49.99.

MindPlay, 100 Conifer Hill Dr., Bldg. 3, Ste. 301, Danvers, MA 01923

Circle Reader Service Number 170.

Party Time for the IIGS

Brøderbund Software has announced the release of *Party Edition*, a graphics library disk designed to be used with the Apple IIGS version of *The Print Shop*.

The two programs together allow users to create personalized invitations, signs, banners, and stationery. Themes include birthdays, weddings, anniversaries, and national holidays. Users can also design special art for almost any event, including barbecues and bon voyage parties.

The disk contains multicolor graphics, borders, letterhead designs, and background and pixel patterns. It also includes 16 full-panel designs that are multicolor theme drawings to fill the front panel of a greeting card or that can be enlarged to cover an 8½ × 11-inch sheet. The elements have been drawn to take advantage of the IIGS's high resolution and color capabilities.

Party Edition has a suggested retail price of \$34.95.

Brøderbund Software, 17 Paul Dr., San Rafael, CA 94903-2101

Circle Reader Service Number 171.

Eight Free-Spirited Adventures

Free Spirit Software has released eight new text-adventure games on two disks for the Apple II series.

Eye of the Inca features four text games. In the title game, players search for a diamond in an ancient temple. Players must survive and escape from a South Seas island in *Shipwrecked*. In *Son of Ali Baba*, the player must defeat an evil magician and his army of monsters in Baghdad. The final game on the

disk is *Perils of Darkest Africa*, where players search for jewels from King Solomon's mines. The four-game disk retails for \$19.95.

Free Spirit's other four-game disk includes the title game, *Revenge of the Moon Goddess*. Players travel into the South American jungles in search of the lost City of the Sun and the gold idol of the Moon Goddess. In *Frankenstein's Legacy*, players encounter cadavers, old mansions, cemeteries, werewolves, and The Creature. *Night of the Walking Dead* has players looking for the grave of Aunt Bedilla, where her locket must be located without their disturbing the dead. In *Sea Phantom*, players encounter ghost ships, sea caves, mansions, and a restless spirit while traveling up and down the Atlantic. The suggested retail price for this four-game disk is \$19.95.

Free Spirit Software, 905 W. Hillgrove, Suite 6, La Grange, IL 60525

Circle Reader Service Number 172.

Free Software

Verbatim is offering personal computer users a free software program each time they purchase a specially marked box of Verbatim's Bonus disks from now through December 1988.

Disk purchasers can choose from *Sinbad's Gammon*, a backgammon game; *Investicalc*, a financial calculation program; and *Banner Maker*, which can print message banners for parties and special events. The three programs are available for the Apple IIe and IIc as well as the IBM PC and the Commodore 64.

To receive the software, buyers must mail the coupon (found inside specially marked ten-packs of Bonus 5¼-inch single-sided/double-density, double-sided/double-density, and double-sided/high-density disks) along with \$1 for shipping and handling. No proof of purchase is necessary. The suggested retail price of each ten-pack is \$9.25, \$10, and \$23, respectively.

There are no quantity limitations, so buyers of multiple boxes can send for an equivalent number of software programs.

Verbatim, Marketing Department, 1200 W. T. Harris Blvd., Charlotte, NC 28213

Circle Reader Service Number 173.

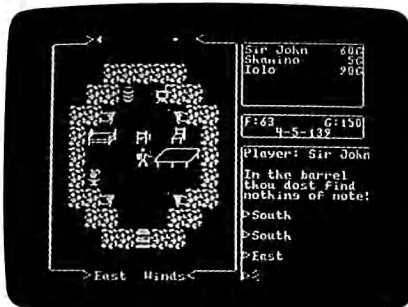
Save Britannia from Oppression

Origin Systems has released the fifth installment of the *Ultima* series with *Ultima V: Warriors of Destiny*. Players encounter a new underground world in this fantasy role-playing game.

The story begins with Lord British, ruler of Britannia, lost in the underworld. In Lord British's absence, Blackthorn has assumed command of the country, becoming a tyrant

in the process. The player's responsibility is to overcome Blackthorn's rule.

Britannia is populated with a large cast of characters whose trust must be earned by the player. *Ultima V* has expanded abilities to converse and interact. Players also have combinations of weapons and armor, amulets, and rings at their disposal. Weapons can be targeted at any opponent within range, regardless of position. The battle bounty includes potions, scrolls, and gems.



Players search for bounty in *Ultima V: Warriors of Destiny*.

The game features graphical detail that includes flying axes, soaring arrows, fountains, waterfalls, and lighthouses with cutting swaths of light. A full musical score is available for computers equipped with a Phasor or with a Mockingbird or MIDI interface.

Ultima V is available for the Apple II series of computers and has a suggested retail price of \$59.95. The game is distributed by Brøderbund.

Origin Systems, 136 Harvey Rd., Bldg. B, Londonderry, NH 03053

Circle Reader Service Number 174.

In Focus

Two new educational programs for the Apple II series have been released by Focus Media.

The Great Knowledge Race is now available for grades 3-8. The program features a color game board where students can test their knowledge in different subject areas. An optional timer provides different levels of difficulty. The four question disks available are Substance Abuse; Math Word Problems (for grades 3 and 4); another Math Word Problems (for grades 5 and 6); and Metrics.

Each package contains one master game disk, one subject-area question disk, and one Teacher's Lesson Planner. The suggested retail price is \$45.

Focus has also expanded the Vocabulary of Science series. The latest release is *The Vocabulary of Computer Science*, which is designed for use in computer literacy classes in grades 7-10.

Students can work alone or in groups

while trying to identify "mystery words" using clues provided by Professor Focus. The program is designed to aid in the development of vocabulary, spelling and word recognition skills, and concepts. Teachers have the option of using the vocabulary on the disk, or they can use the editing feature to create their own list of words and clues.

Topics contained in the program include History of Computers, Computers and Society, Computer Hardware, Computer Programming, and Software Applications.

The package includes the program disk, a backup disk, and a Teacher's Lesson Planner with student worksheets. The program requires at least 64K of memory and retails for \$45.

Focus Media, 839 Stewart Ave., Garden City, NY 11530

Circle Reader Service Number 175.

Laugh and Learn

DLM Teaching Resources has announced the release of two new language arts software programs for the Apple II series. *Language Carnival 1* and *2* help develop language and thinking skills through the use of humor.

The programs first explain how humor is treated. Students can then learn how to compare and contrast relationships between objects and events, examine the meanings of words, and investigate the reasons behind actions.

Activities include solving and explaining jokes in which key words have more than one meaning, and selecting and correcting punch lines. One drill involves riddles that must be answered by thinking of real objects in uncommon ways. In another activity, students must identify the likely results when attributes of two different objects are combined. Students can also produce a humorous story by organizing three-, four-, and five-part jokes in the correct order.

Language Carnival 1 and *2* are both

available for the Apple II series with a minimum of 64K. Both programs contain a 5 1/4-inch disk and a user's guide. The suggested retail price is \$19.95 each.

DLM Teaching Resources, One DLM Park, Allen, TX 75002

Circle Reader Service Number 177.

Bridge for the IIGs

Artworx has recently released *Bridge 5.0* for the Apple IIGs. This bridge-playing program takes advantage of the IIGs's graphics capabilities. The program operates with a mouse interface.

Players have a nearly infinite selection of hands. Any hand can be entered, and players can store and retrieve hands from the disk.

Bridge 5.0 is available on 3 1/2-inch disk only and carries a suggested retail price of \$34.95.

Artworx Software, 1844 Penfield Rd., Penfield, NY 14526

Circle Reader Service Number 181.

Math Activities for Home or School

Friend-Lee Software has introduced *Math Mind Puzzlers*, the fourth in a series of math worksheet generators. This utility allows teachers or parents to print an unlimited number of math activity sheets for students to use at home or at school.

In *Triangle Puzzlers*, students must place the given numbers in the proper order on each side of a triangle so that the sums of each side are equal. The operations include whole numbers, decimals, fractions, standard measurement, and metrics. Twenty-two levels of difficulty are available.

The disk also includes *Sequence Puzzlers*, which requires students to fill in missing numbers in the sequence printed on the activity sheet. The ten levels available challenge students' skills in addition, subtraction, multiplication, division, and mixed operations.

The program is available for the Apple II series and requires a printer. The suggested retail price is \$49.95. With a backup disk, the program retails for \$59.95.

Friend-Lee Software, 6041 West View Dr., Orange, CA 92669

Circle Reader Service Number 180.

Invade Europe

The Avalon Hill Game Company has released *Under Fire* for the Apple II series of computers.

The game is set in Europe during World War II and features forces from the United States, Germany, and the Soviet Union. Players have control over paratroopers, engineers, mountain troops, assault guns, tanks, and weapons such as machine guns, bazookas, and grenades. There are nine scenarios to choose from, and users can build their own with the construction set.

The program contains a tutorial to help first-time players get involved quickly.

Under Fire, which retails for \$59.95, requires 64K and includes a Mapmaker program. A joystick is optional.

The Avalon Hill Game Company, 4517 Harford Rd., Baltimore, MD 21214

Circle Reader Service Number 179.

EA's Time Machine

Electronic Arts has released two new role-playing adventure games for the Apple II series of computers that send players either back to medieval times or into the post-nuclear future. Both titles were designed by Interplay Productions.

The Bard's Tale III: Thief of Fate is the third in a series of medieval-based fantasy games. The game begins with the city of Skara Brae in ruins, destroyed by the Mad God Tarjan. The player must assemble a group of adventurers to search for Tarjan and stop him.

The game features more than 100 magic spells and more than 500 monsters, some of whom can join the player's party, which can be built of male and female characters in as many as 13 character classes. Players encounter as many as 84 dungeon levels and seven different dimensions.

The suggested retail price for *Bard's Tale III* is \$49.95.

In *Wasteland*, players find themselves in the southwestern deserts of the United States in the postnuclear year of 2087.

The story behind the game begins when world powers fire 90 percent of their nuclear arsenals in a panic. The player assumes the role of an engineer working in the desert that day who subsequently takes shelter and starts the Ranger Center, where he forms the Desert Rangers. It's the Desert Rangers' responsibility to help survivors rebuild and live in peace, and to protect the population from mutant villains who wander the desert.

The game features a Paragraphs book, which directs players to certain points in the game. Players can also return to the game after it's over to explore locations they were not able to find the first time.

Wasteland has a suggested retail price of \$49.95.

Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404

Circle Reader Service Number 176.



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Advertisers Index

Reader Service Number/Advertiser

	Page
102 Abby's Discount Software	74
103 Abracadata	72
104 Activision, Inc.	BC
AppleFest '88	78-79
105 Balboa Game Company	77
106 Berkeley Softworks	20-21
107 Big Red Computer Club	57
108 Central Point Software	IFC
109 Computer Direct	68-69
110 Computer Place	77
Crown Custom Covers	64
Damark International, Inc.	63
111 Data Pak Software	IBC
112 Free Spirit Software	64
113 GSF	80
114 Hearlihy & Co.	72
115 Indus-Tool	72
116 Infocom	1
117 Mad Scientist Software	74
118 Magic Software	74
119 NEXO Distribution	76
120 North Forty Enterprises LTD.	80
121 Precision Data Products	42
122 The Public Domain Exchange	55
123 Renco Computer Printer Supply	80
124 Rodeo Products	76
125 Roger Wagner Publishing	80
126 Soft-Byte	72
127 TEVEX	39

ABC's Personal Publisher	7
COMPUTE!'s Apple Applications Disk Subscription	29
COMPUTE!'s Apple Applications Subscription	9
COMPUTE! Books for the Apple IIGs	23
COMPUTE! Quick & Easy Books for Macintosh	62
New Apple IIGs books from COMPUTE!	17

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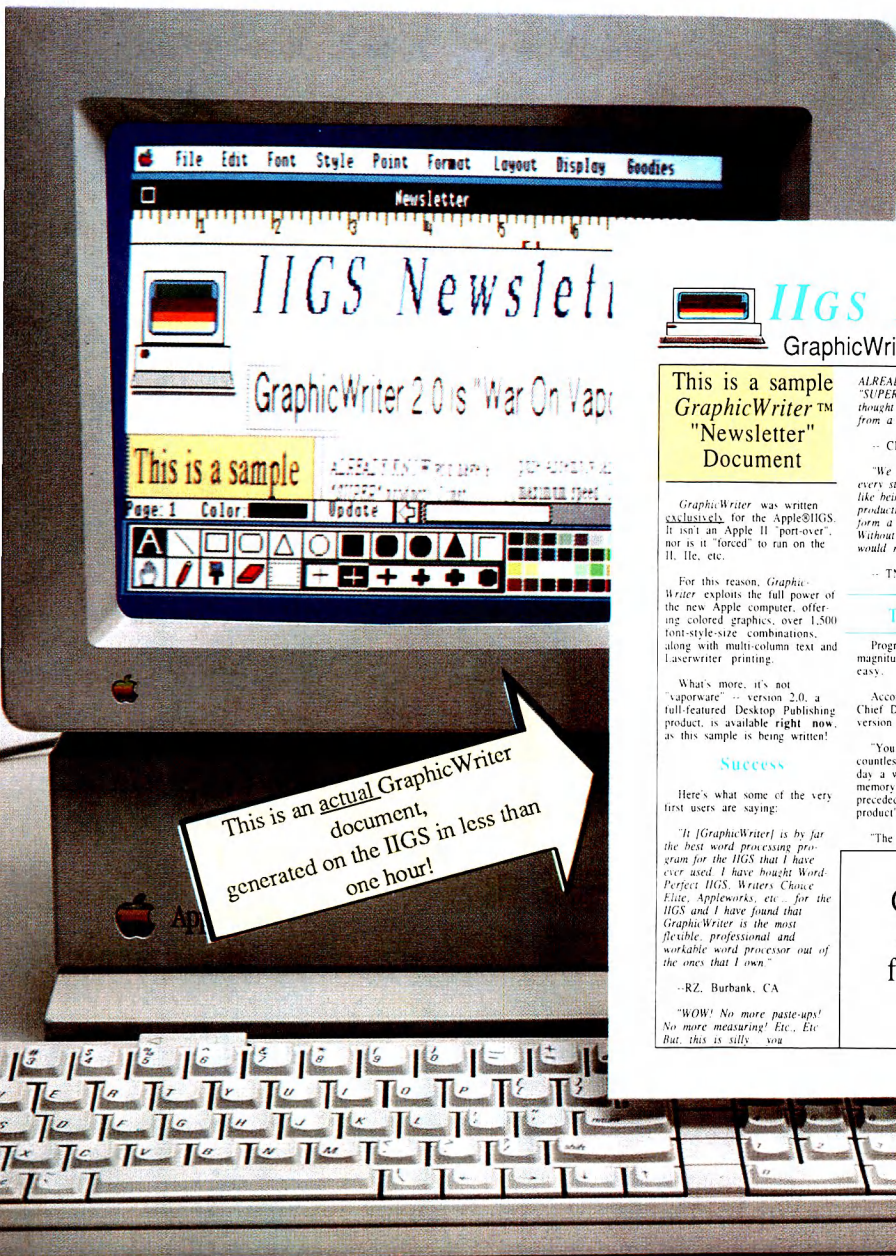
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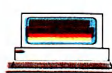
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This is an actual GraphicWriter document, generated on the IIGS in less than one hour!



IIGS Newsletter

GraphicWriter 2.0 is "War On Vaporware"

This is a sample GraphicWriter™ "Newsletter" Document

GraphicWriter was written exclusively for the Apple® IIGS. It isn't an Apple II "port-over", nor is it "forced" to run on the II, Ix, etc.

For this reason, GraphicWriter exploits the full power of the new Apple computer, offering colored graphics, over 1,500 font-style-size combinations, along with multi-column text and Laserwriter printing.

What's more, it's not "vaporware" -- version 2.0, a full-featured Desktop Publishing product, is available right now as this sample is being written!

Success

Here's what some of the very first users are saying:

"It [GraphicWriter] is by far the best word processing program for the IIGS that I have ever used. I have bought Word-Perfect, IIGS Writers Choice, Elite, Appleworks, etc. -- for the IIGS and I have found that GraphicWriter is the most flexible, professional and workable word processor out of the ones that I own."

-RZ, Burbank, CA

"WOW! No more paste-ups! No more measuring! Etc., Etc. But this is silly -- you

ALREADY KNOW you have a "SUPER" product! I just thought you needed to hear it from a satisfied customer!"

-- CB, N. Canton, Ohio

"We use GraphicWriter in every step along the way and it's like being on stage and seeing a production blending together to form a wonderful masterpiece. Without your program this would not be possible."

-- TN, St. Louis, MS

Tech "Trivia"

Programming a product of this magnitude, however, is not easy.

According to Gary Crandall, Chief Developer, the new version was a "struggle".

"You have no idea of the countless sleepless nights, the 7 day a week grind, fighting memory space, etc., that preceded the evolution of this product", said Crandall.

"The program is written in

pure Assembly language for maximum speed. It contains over 100,000 lines of assembly, and 25,000 symbols (address labels).

"I cannot even conceive of so-called competition coming even remotely close to the magnitude of GraphicWriter 2.0!"

It's true -- GraphicWriter contains 100,000 Assembly statements; the actual number of feature-user combinations is computed to be over 5,000. In other words, there are 5,000 ways that one can use the product.

GraphicWriter 2.0 took 8 months to create, and required over 200 hours of beta testing.

Other Features

In addition to multi-column text, GraphicWriter can also wrap text around, or "hop over" pictures and illustrations (this document itself, for instance, is an example -- notice how this text "avoids" the area on the bottom-right portion of this document).

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Automatic 256 color gradient palette	✓	
Rotate objects in 1° increments	✓	✓
2 canvases to paint on	✓	✓
Mask any area or image at any time	✓	
Mask colors	✓	✓
Slippy colors for lasso	✓	
Variable-zoom FatBits	✓	✓
16 Built-in patterns in the on-screen toolbox	✓	
4 Independent 16 color gradient palettes	✓	
Resize & bend objects	✓	✓
Distort objects	✓	
Anything can be a brush	✓	✓
Variable speed animation	✓	
Color cycling (simulated animation)	✓	✓
Smear, shade, & smooth colors	✓	✓
Automatic corner rounding	✓	
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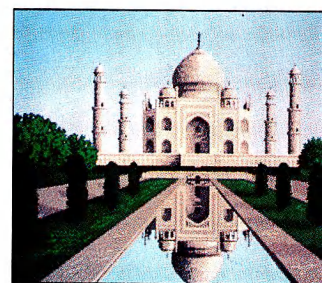
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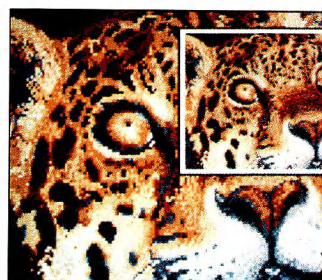
Send page 1 from your manual (originals only) and a check or money order to: **The Gold Standard, Activision, 2350 Bayshore, Mtn. View, CA 94043.**

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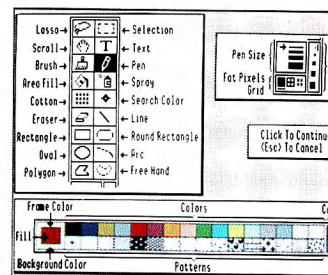
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Over 80 new features, including on-screen gradient fill tools and variable FatBits controls. And if you forget the command, three help screens like this one are at your click away.

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